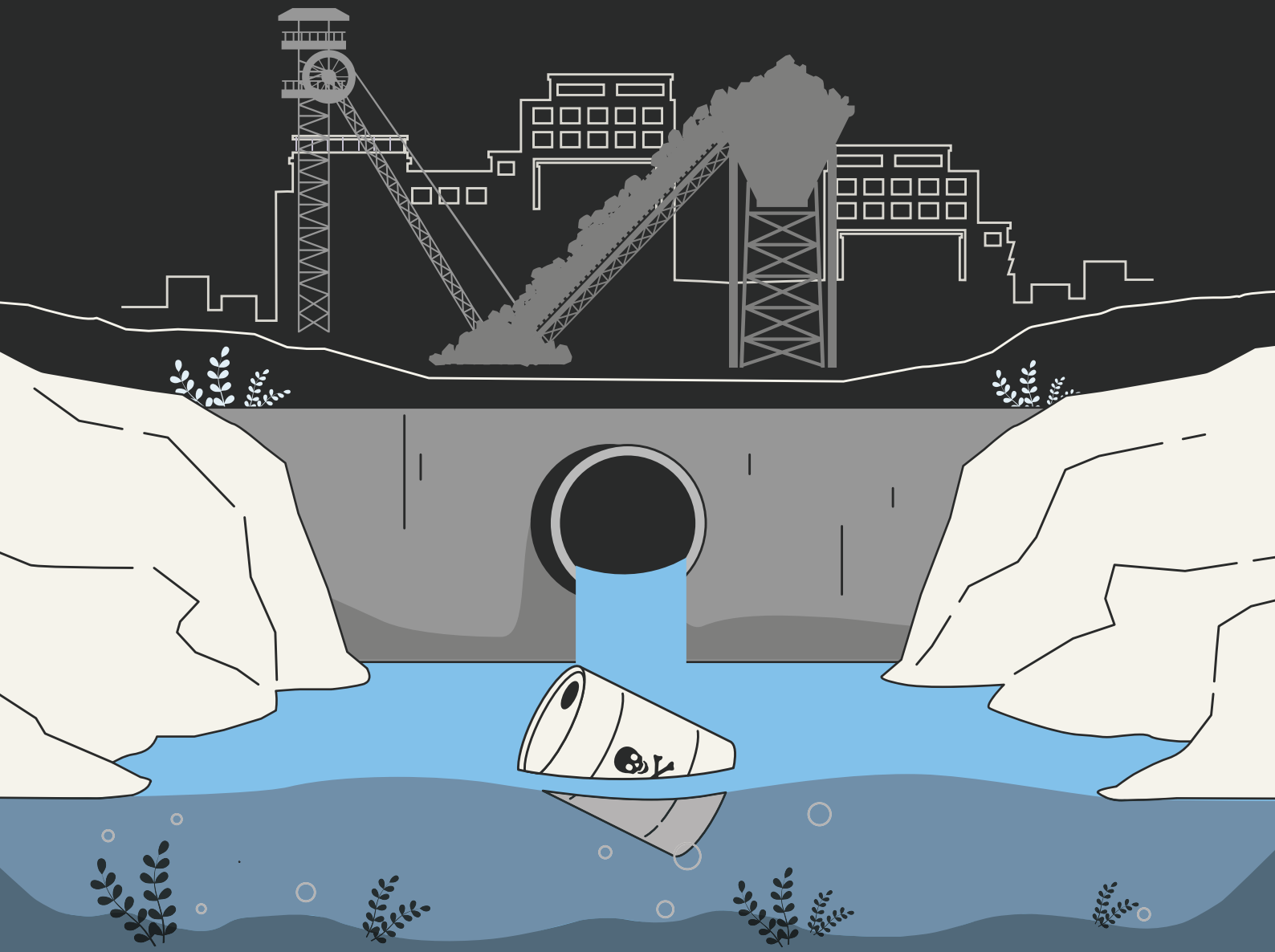
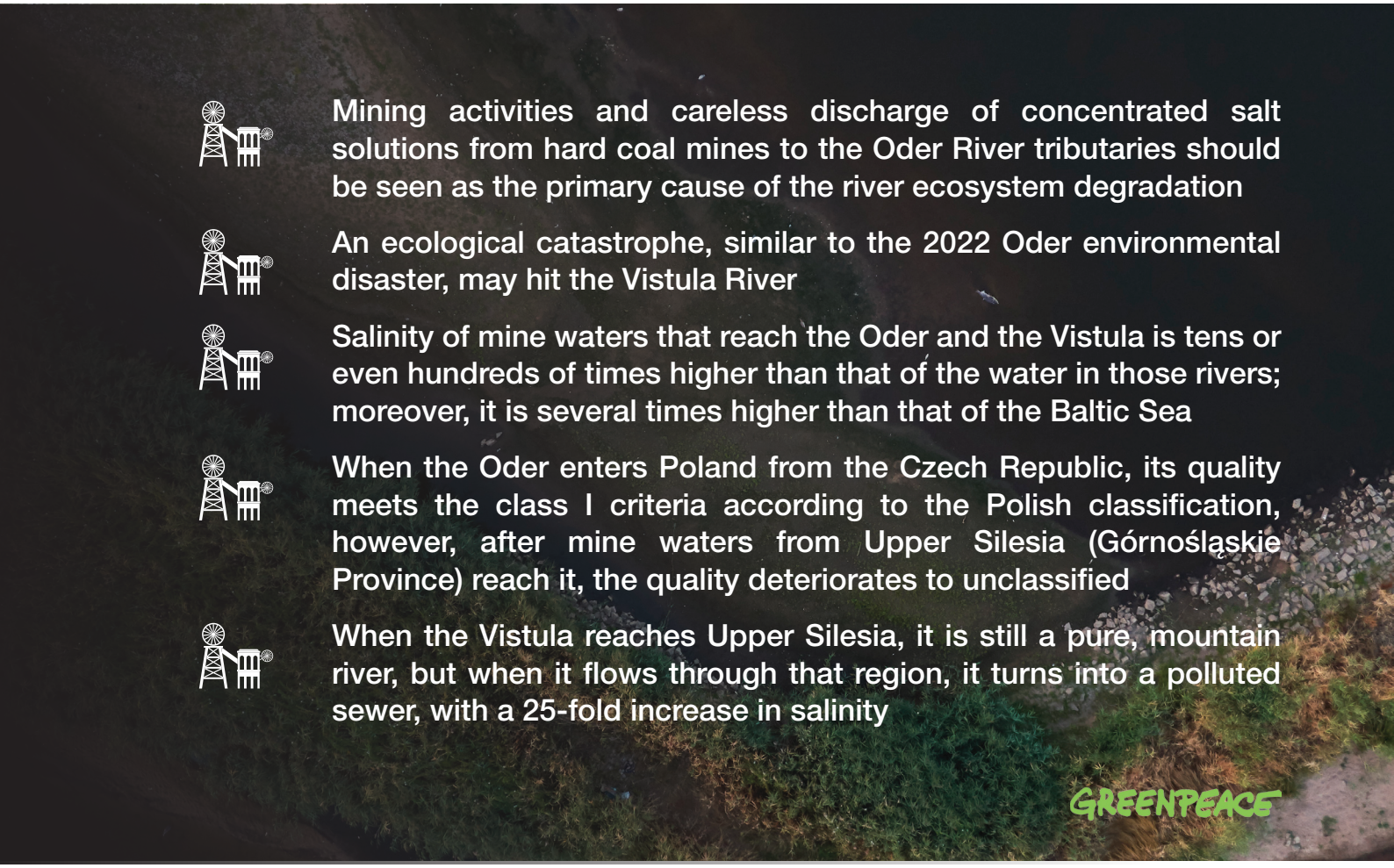
GREENPEACE

SALINISATION OF POLAND'S TWO MAJOR RIVERS BY MINING COMPANIES

A GREENPEACE STUDY 2022/2023



SALINISATION OF POLAND'S TWO MAJOR RIVERS BY MINING COMPANIES – A GREENPEACE STUDY



- Mining activities and careless discharge of concentrated salt solutions from hard coal mines to the Oder River tributaries should be seen as the primary cause of the river ecosystem degradation
- An ecological catastrophe, similar to the 2022 Oder environmental disaster, may hit the Vistula River
- Salinity of mine waters that reach the Oder and the Vistula is tens or even hundreds of times higher than that of the water in those rivers; moreover, it is several times higher than that of the Baltic Sea
- When the Oder enters Poland from the Czech Republic, its quality meets the class I criteria according to the Polish classification, however, after mine waters from Upper Silesia (Górnośląskie Province) reach it, the quality deteriorates to unclassified
- When the Vistula reaches Upper Silesia, it is still a pure, mountain river, but when it flows through that region, it turns into a polluted sewer, with a 25-fold increase in salinity

Between November 2022 and January 2023, Greenpeace noted several cases of extreme salinisation of the Silesian rivers, to which mine water is discharged. High-salinity mine waters constitute a medium for toxic algae, which caused the 2022 Oder environmental disaster. Indeed, activities of the mining companies and careless discharge of concentrated salt solutions to the Oder tributaries should be seen as the primary cause of the river ecosystem degradation. In summer, high temperatures and decreased water level in the Oder may lead to another, similar disaster. Additionally, if the toxic microorganisms have already reached the Vistula basin as well, such ecological disaster may also hit Poland's largest river. Mine water discharged there has the highest salinity out of all samples tested by Greenpeace. This situation is aggravated by the fact that some mines discharge brine directly to the Vistula, rather than to its tributaries. What is more, the Vistula, in its Upper-Silesian segment, carries 3-5 times less water than the Oder. Therefore, urgent action is necessary in order to protect the two largest rivers in Poland and to limit the negative effect of mining on the river ecosystems.

WE CALL FOR:

LIMITING THE NEGATIVE EFFECT OF MINING ON THE ODER AND VISTULA ECOSYSTEMS

Hard coal mining in the Upper Silesian Coal Basin is the major contributor to the salinisation of Poland's two largest rivers, which, together with their tributaries, cover as much as 70% of the national water demand in Poland. We appeal to the Ministry of Climate and Environment to take urgent action in order to limit the impact the coal mining companies have on the ecosystems, in order to prevent a catastrophe similar to the one that hit the Oder in summer 2022. Those necessary actions include:

- Mining companies should immediately be required to perform environmental impact evaluations of hard coal mining and obtain environmental permits that would define the mitigation measures to minimise the effect of coal mining on the environment and on the people
- Mining companies should be required to implement modern technologies of desalination of groundwater drained from coal deposits and discharged into rivers
- Concessions issued to mining companies under water legislation should be inspected, and the chloride and sulphide concentration limits in the wastewater discharged into rivers by those companies should be made more stringent

ELIMINATING LEGAL CHAOS IN THE WATER AND WASTEWATER LEGISLATION

The legislation needs to be harmonised in order to achieve the ecological objectives set out in the EU Water Framework Directive for the common water policy.

CREATING THE LOWER ODER VALLEY NATIONAL PARK

Providing the highest level of protection for the Lower Oder Valley is the best response to the environmental crisis that has affected the river since the summer 2022 incident. Urgent action is necessary to rebuild this valuable river ecosystem. Therefore we appeal to Mr Mateusz Morawiecki, the Prime Minister of the Republic of Poland, to create the Lower Oder Valley National Park and take any other necessary action towards renaturalisation of this unique Polish river.

INTRODUCTION

In July and August 2022, the Oder was hit by an unprecedented ecological catastrophe. Along the stretch of several hundred kilometres, roughly between Oława and Szczecin, a large-scale die-off of aquatic wildlife was reported, including fish and clams. The cause of this mass mortality event could not be readily determined. The government established a special team of scientists, who published preliminary research results in September 2022. According to the report, this disaster was caused by toxins deadly to the fish, produced by *Prymnesium parvum*, a unicellular algae species responsible for similar events in many other countries around the world. Massive bloom of these algae, also known as the golden algae, was associated with increased salinity of the Oder, registered by the water monitoring stations. Experts in the team established by the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) in Germany came to similar conclusions.

However, neither of those teams researched the causes of the unnaturally high salinity of the Oder or the way the toxic algae were introduced to its waters. *Prymnesium parvum* are usually found in moderately salty waters in river deltas or estuaries, coastal lagoons or bays. Scientists of the Institute of Environmental Biology at the University of Warsaw pointed to two possible scenarios of the golden algae bloom: 1. discharge of substances that caused water salinisation, which enabled mass development of these microorganisms directly in the Oder; 2. algal bloom in some unidentified, salty water reservoir, from which the water was then discharged into the Oder[1]. The very appearance of *Prymnesium parvum* in Poland, never observed on such a scale in the past, probably resulted from its transmission from abroad (as it is an invasive species). This problem might also affect other rivers (including the Vistula), which is a dire prediction for the future. The said ecological catastrophe was caused by a living organism, nevertheless, it was not a natural process: it happened because of human activity.

We had known for years that the condition of the Oder is poor. Data analysis performed by the Chief Inspectorate for Environmental Protection (GIOŚ) in Poland confirmed severe salinisation of this river. In 2020, near the locality of Kędzierzyn-Koźle, the combined concentration of chlorides and sulphides, which constitute the main ingredients of salts found in the rivers, amounted to over 400 mg/L. This value exceeded the class II limits of the water quality classification back then[2] as much as 4 times. Conversely, the Oder water at its entry from the Czech Republic to Poland (only 80 km upstream) contained 3 times less salts. The situation is even worse in the case of Vistula at the border between the Śląskie and Małopolskie Provinces in Poland. In 2019, water salinity in these provinces was around 20 times higher than the class II limits. This problem was seemingly solved by the new legislation passed in 2022. Chlorides and sulphides were removed from the list of water quality indices. As a result, there are currently no limits on the chloride and sulphide levels and their content is not monitored. The only river water salinity parameter currently used is the specific electrolytic conductivity at 20 degrees Celsius.

Water salinity is a problem underestimated by the governmental agencies, with dire consequences not only for the Oder and Vistula, but also for other rivers. Barely a month before the Oder environmental disaster, Greenpeace analysed water samples from the Miedzianka River, where wastewater is discharged from the brown coal mine in Turów and the Turów power plant. At its point of confluence with the Nysa Łużycka River, its specific conductivity exceeded the class II limit nearly 3-fold. At the Polish-Czech border, or upstream from the Turów surface mine and power plant, the same river met the class I criteria.

1. https://upwr.edu.pl/aktualnosci/eksperci-upwr-o-odrze--zlote-algi-to-glowny-podejrzany-w-sprawie-3869.html
2. In Poland, a three level classification of physicochemical parameters (including salinity) of water quality is applied: class I, class II and unclassified. Physicochemical parameters, biological parameters and hydromorphological parameters help determine the ecological condition and ecological potential of lakes and rivers (on a five-point scale). Together with the so-called chemical condition, these parameters help determine the general water condition.

Nevertheless, the Polish General Directorate for the Environmental Protection (GDOŚ) was unimpressed and sustained the controversial environmental permit for surface mining in Turów. Consequently, further discharge of high-salinity mine water into the river was possible.

WHAT IS THE REASON FOR RIVER SALINISATION?

Experts point out that the major cause of high salinity in such rivers as the Oder or the Vistula is the mining industry, especially coal mining. Hard coal mining involves drainage of huge amounts of mine water. This is because groundwater enters the mining pits, and needs to be removed. Such mine water contains high amounts of chloride and sulphide salts. Usually, the deeper the coal seam, the higher the mine water salinity. Mine water is removed from mine pits to the surface and directed to the nearby drainage ditches, natural or artificial, eventually reaching streams and rivers. In Upper Silesia, which is Poland's major hard coal mining region, pollutants contained in the mine waters reach the Vistula and Oder. This way, Poland's two largest rivers are subject to salinisation practically from their sources.

CONSEQUENCES OF HIGH RIVER SALINITY

Salinisation of rivers has a strong impact on river ecosystems. Organisms inhabiting rivers have adapted to fresh-water conditions, namely to low levels of salts, particularly chlorides and sulphides. Only selected aquatic species tolerate a wide range of salinity and show high resistance to its variations. Those species inhabit river deltas and estuaries, coastal lagoons and bays, where water salinity is moderate.

Appearance of the toxic, saltwater *Prymnesium parvum* algae in the Oder caused a die-off of whole populations of fish in this river. A similar disaster may repeat itself in the Oder and hit the Vistula as well.

THERE IS NO EVALUATION OF THE ENVIRONMENTAL IMPACT OF MINES

Experts agree that high salinity of the Oder and Vistula Rivers is caused to a large extent by hard coal mine wastewater discharge in Upper Silesia. However, no details are available, because the vast majority of mines excavate coal without environmental impact evaluations[3]. This is because initially the mines obtained their permits in the 1990s, before the Environmental Impact Assessment Act[4] (The OOŚ Act) entered into force. However, this situation is more complex. The above mentioned permits expired in recent years and the mines required environmental impact evaluations in order to have them extended. The Polish Parliament circumvented this issue by amending the Geological and Mining Law Act and the OOŚ Act, so that a one-time extension of the hard coal mining permits was possible without such evaluations. On that basis, in the years that followed, the Ministry of Environment extended 16 mining permits, some of them until late 2040s, even though the environmental impact evaluations of those mines had not been performed.

This gross violation of the EU law was met with a firm reaction of the European Commission. The Polish Parliament responded by another amendment of the OOŚ Act, cancelling the

3. The purpose of environmental impact evaluations is to assess the effect of a planned investment on the environment (human health included). This procedure includes: verifying the environmental impact report (provided by the investor) as well as obtaining the expert opinions and permits required by law. Additionally, the OOŚ procedure requires that the public is given the right to participate.
4. Ustawa o udostępnianiu informacji o środowisku i jego ochronie, udziale społeczeństwa w ochronie środowiska oraz o ocenach oddziaływania na środowisko (Polish Act on the provision of information on the environment and its protection, public participation in environmental protection and environmental impact assessments). Thereunder, the investors are required to perform environmental impact evaluations of their investments, coal mines included.

controversial amendment. Still, the mining permits remained in force. This way, the provisions that clearly violated the EU directives were cancelled, but their legal consequences remained. Greenpeace described this appalling case in September 2021 *(https://www.greenpeace.org/poland/aktualnosci/30561/greenpeace-ujawnia-co-najmniej-9-slaskich-kopaln-dziala-nielegalnie/).*

As a result, it is unclear to what extent each particular Upper Silesian hard coal mine contributed to the poor condition of the Oder and Vistula Rivers by discharging high-salinity wastewater into the surface waters. In order to check this, Greenpeace carried out a study.

WHAT DID WE STUDY AND HOW

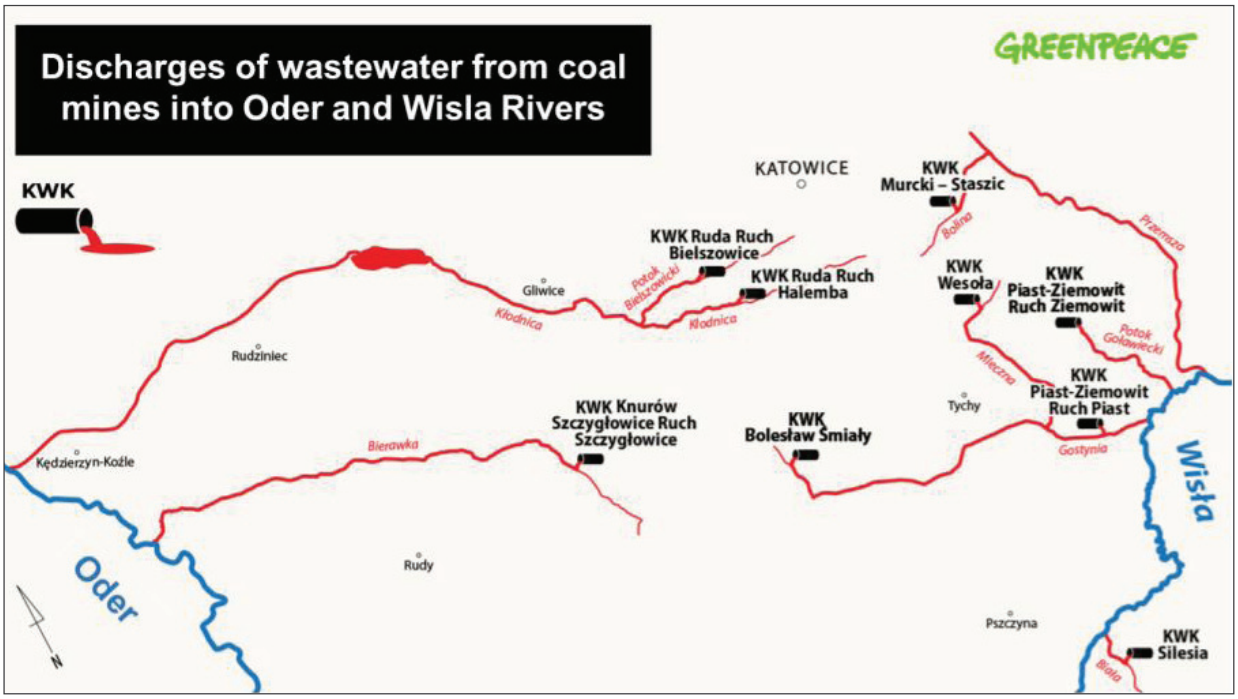
Greenpeace, with the help of scientists-chemists, took samples of wastewater discharged by selected hard coal mines that had obtained one-time permit extensions without the environmental impact evaluation:

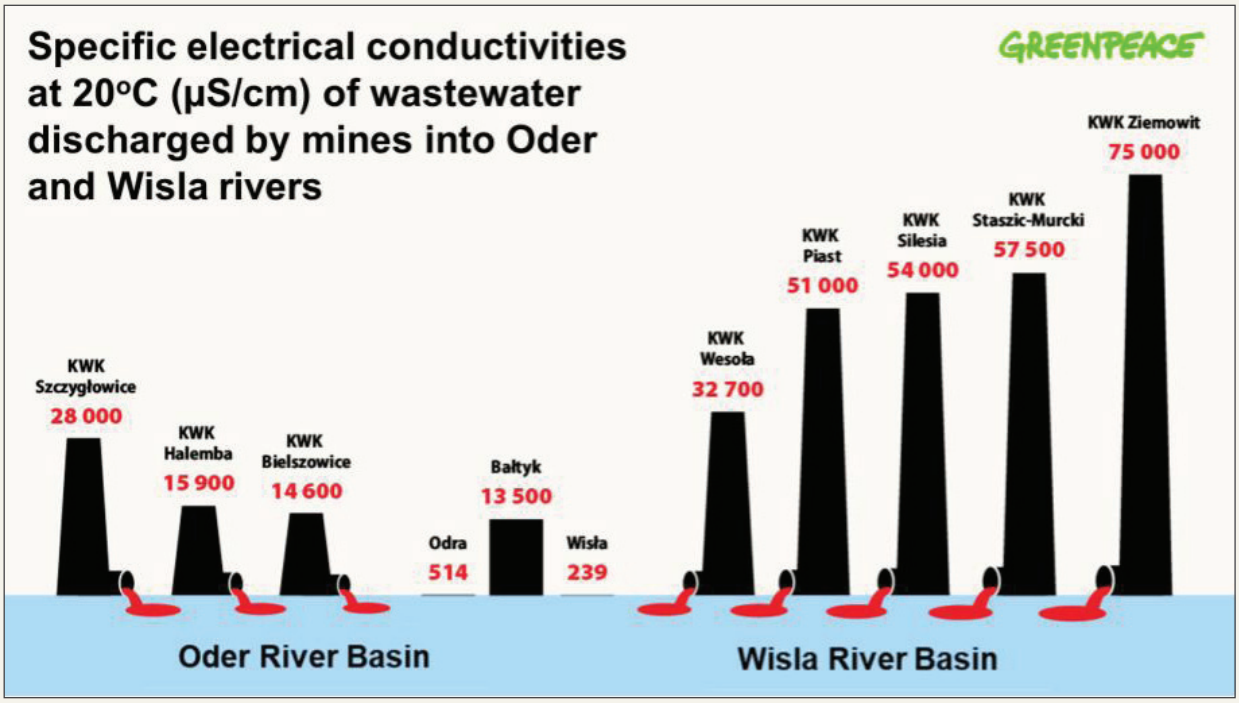
a) In the Oder Basin:

- Knurów-Szczygłowice Coal Mine (company: Jastrzębska Spółka Węglowa), Szczygłowice Excavation (in Knurów): discharge to the Bierawka River
- Ruda Coal Mine (company: Polska Grupa Górnicza), Halemba Excavation (in Ruda Śląska): discharge to the Kłodnica River
- Ruda Coal Mine (company: Polska Grupa Górnicza), Bielszowice Excavation (in Ruda Śląska): discharge to the Bielszowicki Stream (known as Kochłówka), a tributary of the Kłodnica River

c) In the Vistula Basin:

- Silesia Coal Mine (company: Przedsiębiorstwo Górnicze "Silesia") in Czechowice-Dziedzice: discharge to the Biała River
- Mysłowice-Wesoła Coal Mine (company: Polska Grupa Górnicza), Wesoła Excavation (in Mysłowice): discharge to the Pstrążnik Stream, a tributary of the Mleczna River and then Gostynia River
- Piast-Ziemowit Coal Mine (company: Polska Grupa Górnicza), Piast Excavation (in Bieruń): discharge to the Gostynia River
- Piast-Ziemowit Coal Mine (company: Polska Grupa Górnicza), Ziemowit Excavation (in Lędziny): discharge to the Potoku Goławieckiego
- Bolesław Śmiały Coal Mine (company: Polska Grupa Górnicza) in Łaziska Górne: discharge to the Gostynia River
- Staszic-Wujek Coal Mine (company: Polska Grupa Górnicza), Staszic-Murcki Excavation (in Katowice): discharge to the Bolina Stream, a tributary of the Czarna Przemsza River and then Przemsza River





AIM OF THE STUDY: EVALUATING THE EXTENT TO WHICH THE MINING INDUSTRY CONTRIBUTES TO THE SALINITY OF POLAND'S TWO LARGEST RIVERS, THE VISTULA AND THE ODER

The scientists analysed the waters pumped from the mines (before they were discharged into the rivers), using specific electrolytic conductivity at 20 degrees Celsius as the basic river water salinity parameter, and then sent the samples to an accredited laboratory to determine the levels of chlorides and sulphides. Similar conductivity tests were performed in case of rivers to which mining water is discharged. The results were terrifying. Waters pumped from mines and discharged into the Oder Basin and the Vistula Basin rivers are a high-concentrated brine. Their specific conductivity, as well as their combined concentration of chlorides and sulphides are tens or even hundreds of times higher than that of the Oder and the Vistula waters, and even several times higher than in the Baltic Sea!

Waters pumped from mines and discharged into the Oder Basin and the Vistula Basin rivers are a high-concentrated brine. Their specific conductivity, as well as their combined concentration of chlorides and sulphides are tens or even hundreds of times higher than that of the Oder and the Vistula waters, and even several times higher than in the Baltic Sea!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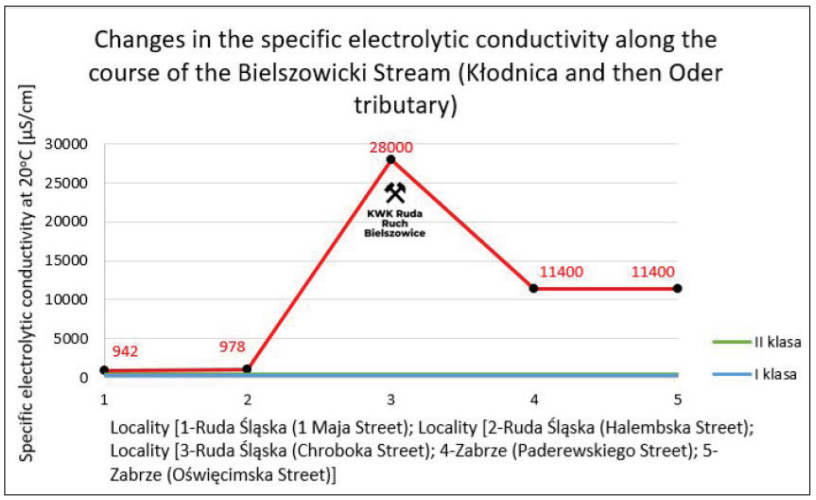
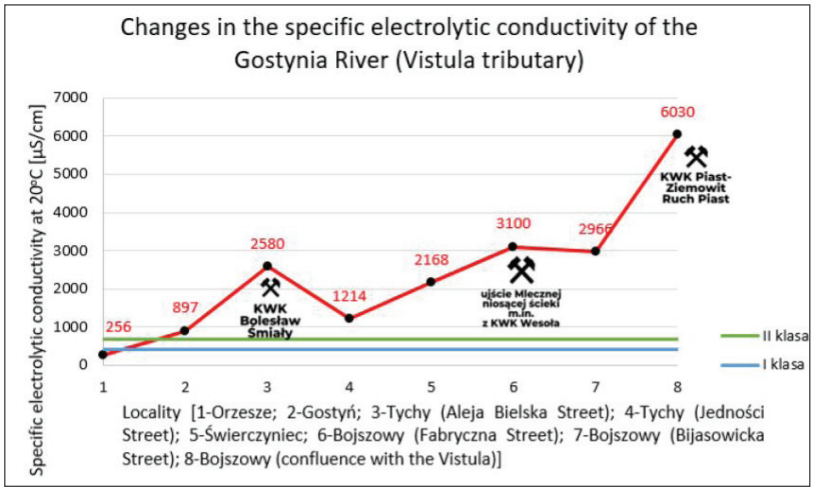
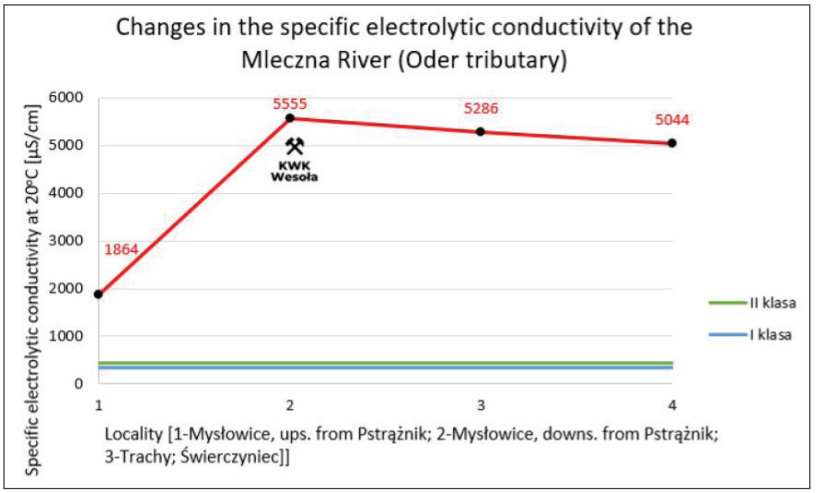
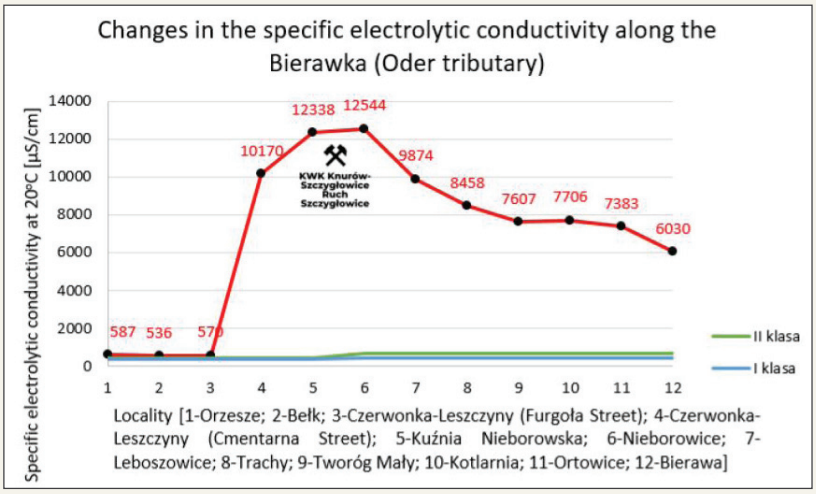
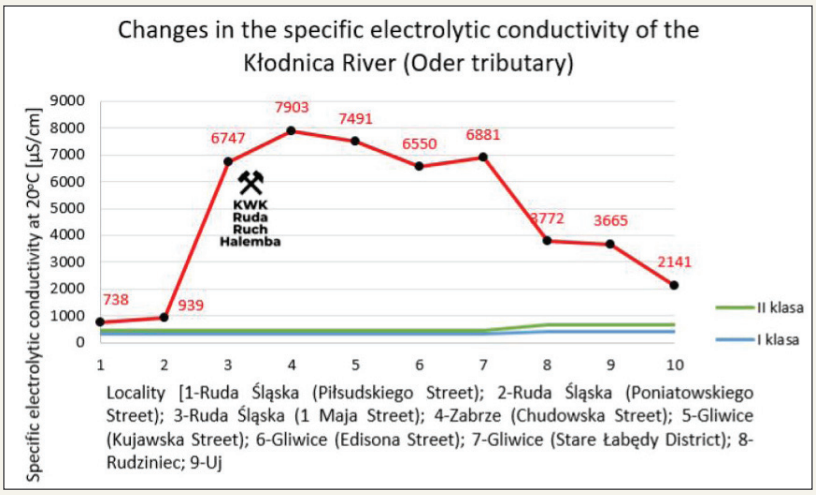

Changes in the specific electrolytic conductivity along the course of the Bielszowicki Stream (Kłodnica and then Oder tributary)
Specific electrolytic conductivity at 20°C [µS/cm]
30000
25000
20000
15000
10000
5000
0
942
978
28000
11400
11400
KWK Ruda Ruch Bielszowice
1
2
3
4
5
II klasa
I klasa
Locality [1-Ruda Śląska (1 Maja Street); Locality [2-Ruda Śląska (Halembska Street); Locality [3-Ruda Śląska (Chroboka Street); 4-Zabrze (Paderewskiego Street); 5-Zabrze (Oświęcimska Street)]


Changes in the specific electrolytic conductivity of the Gostynia River (Vistula tributary)
Specific electrolytic conductivity at 20°C [µS/cm]
7000
6000
5000
4000
3000
2000
1000
0
256
897
2580
1214
2168
3100
2966
6030
KWK Bolesław Śmiały
ujście Mlecznej niosącej ścieki m.in. z KWK Wesoła
KWK Piast-Ziemowit Ruch Piast
1
2
3
4
5
6
7
8
II klasa
I klasa
Locality [1-Orzesze; 2-Gostyń; 3-Tychy (Aleja Bielska Street); 4-Tychy (Jedności Street); 5-Świerczyniec; 6-Bojszowy (Fabryczna Street); 7-Bojszowy (Bijasowicka Street); 8-Bojszowy (confluence with the Vistula)]


Changes in the specific electrolytic conductivity of the Mleczna River (Oder tributary)
Specific electrolytic conductivity at 20°C [µS/cm]
6000
5000
4000
3000
2000
1000
0
1864
5555
5286
5044
KWK Wesoła
1
2
3
4
II klasa
I klasa
Locality [1-Mysłowice, ups. from Pstrążnik; 2-Mysłowice, downs. from Pstrążnik; 3-Trachy; Świerczyniec]]





Bierawka and Kłodnica Rivers - their salinity may exceed the class II limits even 3–10 times.

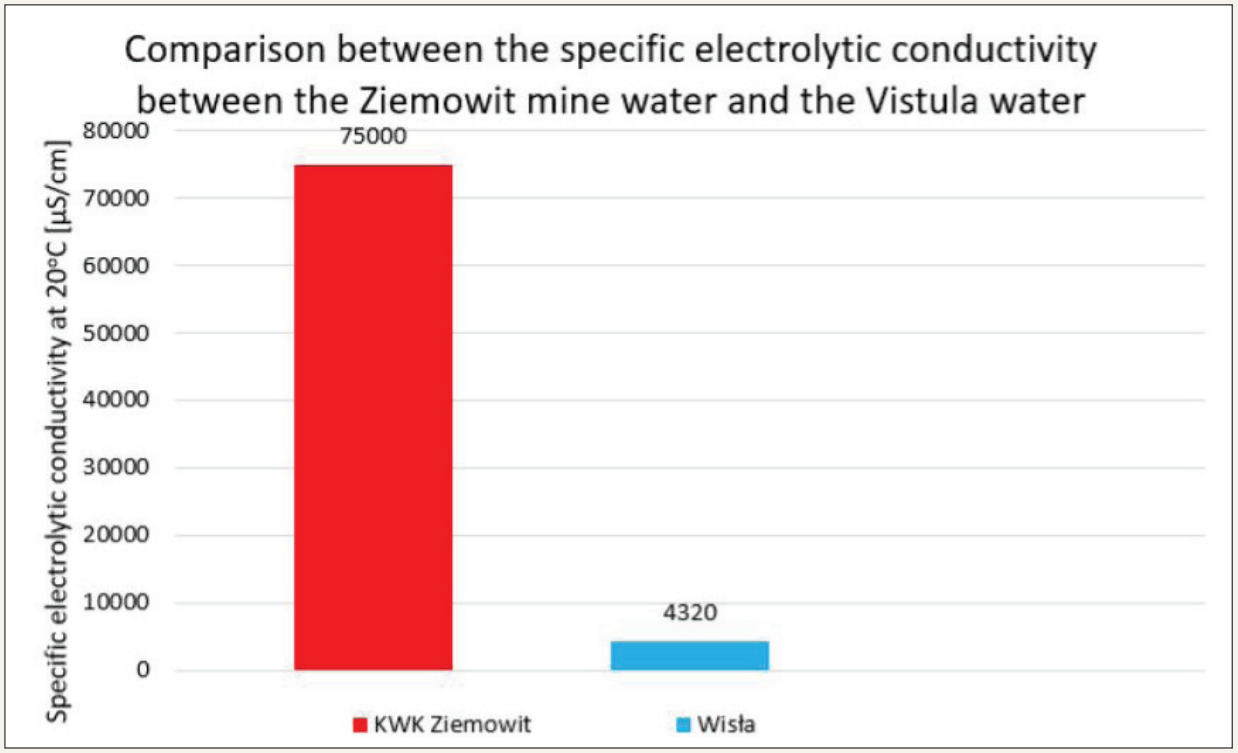
Gostynia River, at the peak of its salinity, exceeding the class II limits 10 times.

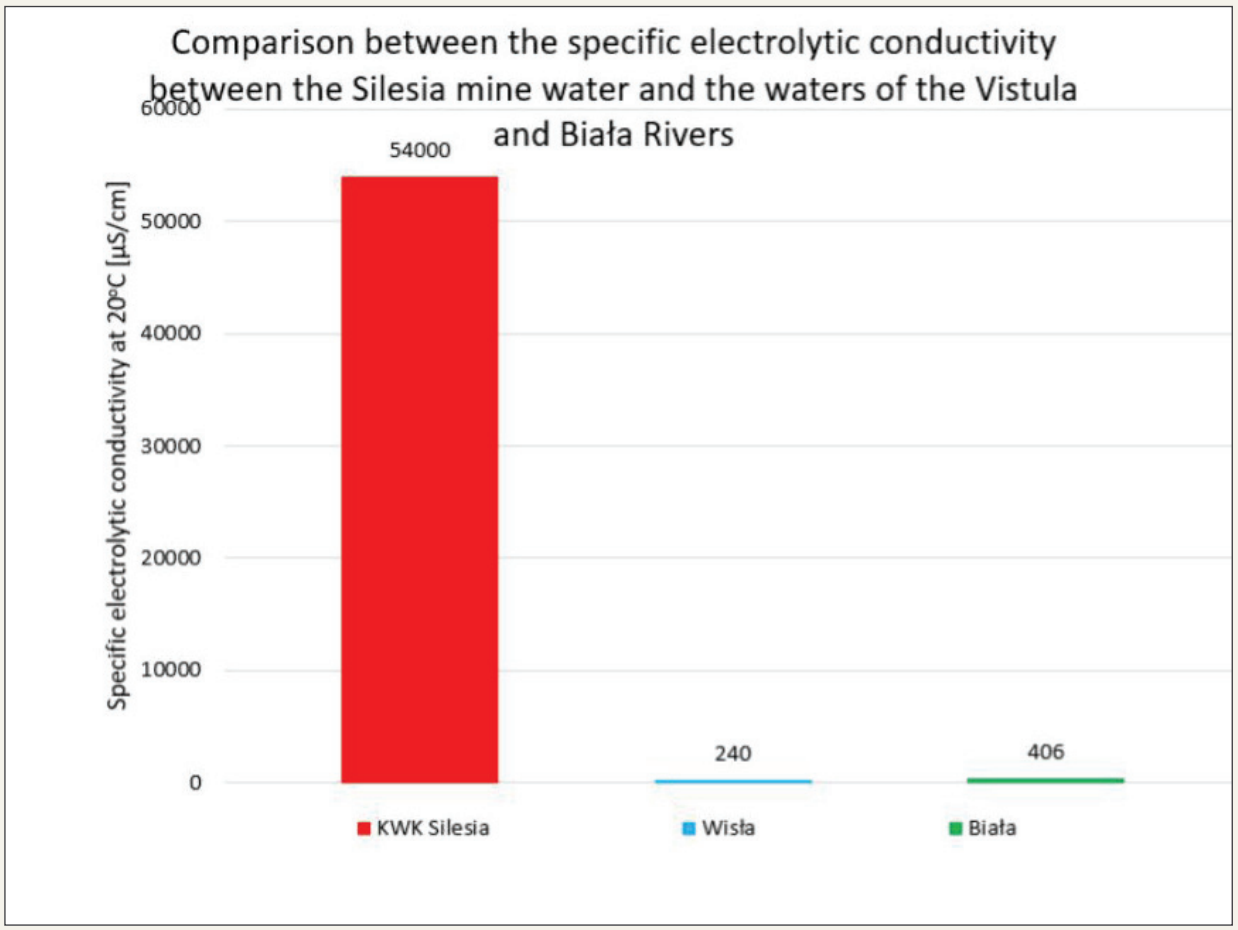
Salinity of those mine waters is more than a 100 times higher than in waters of any of those rivers.

ANALYSIS RESULTS

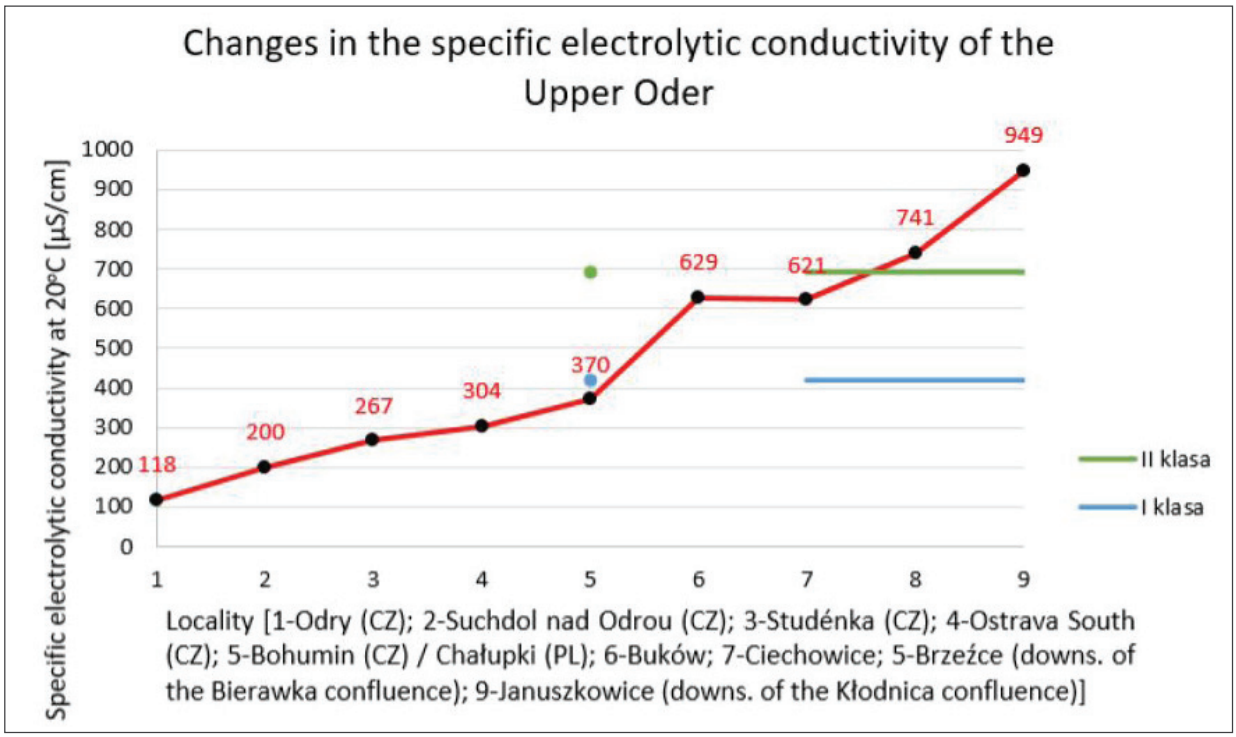
The consequences of discharging brine into the surface waters were predictable. Salinity of the Oder tributaries (Bierawka, Kłodnica) and the Vistula tributaries (Gostynia) is low, yet after mixing with mining waters it radically increases – several times or even tens of times. This is particularly apparent for the Bielszowicki Stream as well as the Bierawka, Kłodnica, Gostynia and Mleczna Rivers.

The graphs show that the Bierawka and Kłodnica Rivers, which are relatively long (55 km and 75 km respectively) become gradually diluted after exiting the Upper Silesia. Nevertheless, at their confluence with the Oder, their salinity may exceed the class II limits even 3–10 times. On the other hand, the Gostynia River, which is much shorter (30 km) and receives a huge load of salts both in its middle course from the Wesoła mine, and in its lower course from the Piast Excavation of the Piast-Ziemowit mine, has got no opportunity to undergo at least partial self-cleansing and reaches the Vistula at the peak of its salinity, exceeding the class II limits 10 times. Even more concentrated brine is discharged practically directly into the Vistula by the Ziemowit Excavation of the Piast-Ziemowit mine in Lędziny and the Silesia mine in Czechowice-Dziedzice. Salinity of those mine waters is more than a 100 times higher than in waters of any of those rivers.

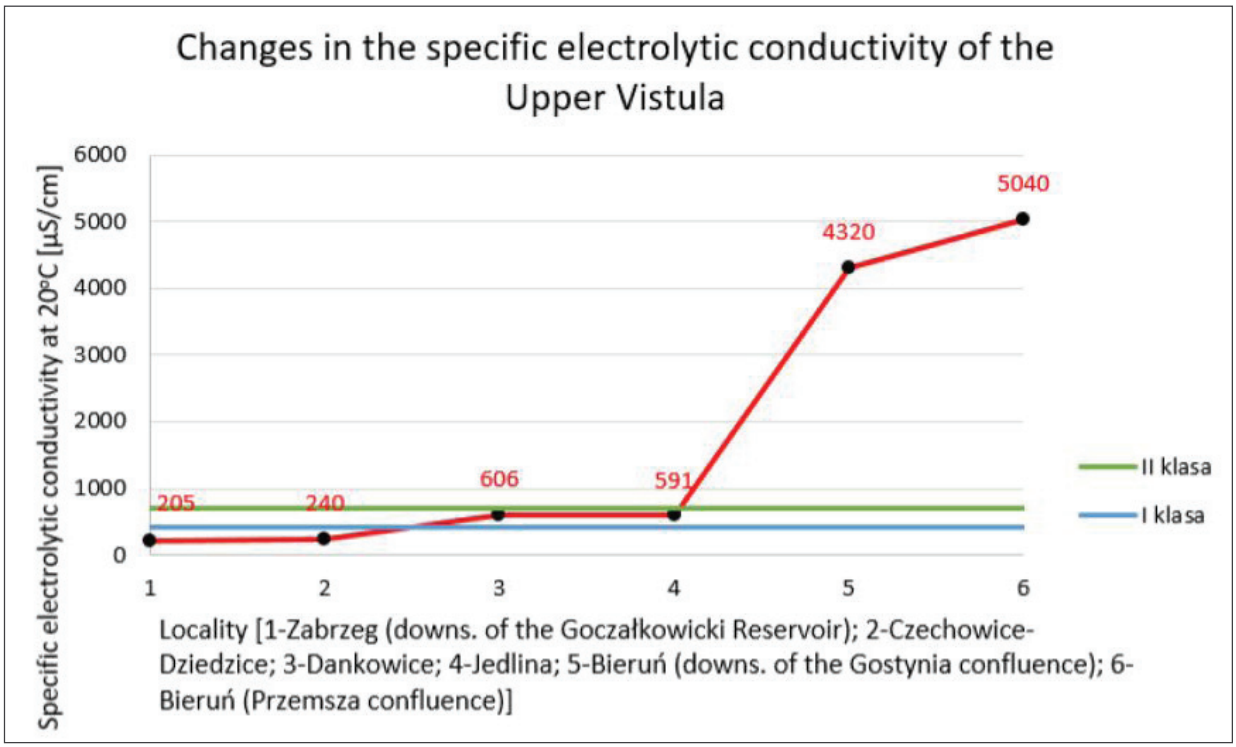

Comparison between the specific electrolytic conductivity between the Ziemowit mine water and the Vistula water
Specific electrolytic conductivity at 20°C [µS/cm]
80000
70000
60000
50000
40000
30000
20000
10000
0
75000
4320
KWK Ziemowit
Wisła


Comparison between the specific electrolytic conductivity between the Silesia mine water and the waters of the Vistula and Biała Rivers
Specific electrolytic conductivity at 20°C [µS/cm]
60000
50000
40000
30000
20000
10000
0
54000
240
406
KWK Silesia
Wisła
Biała

As a consequence of discharging such high-salinity wastewater, the Oder increases its salinity several times and the Vistula – tens of times after flowing through the Upper Silesia!



Greenpeace scientists analysed the Oder practically from its source in the Czech Republic, as well as in Poland. In the whole segment of the river that flows through the Czech Republic (approximately 100 km), the Oder meets the Polish criteria of class I water quality in terms of salinity. However, in Poland, in the Upper Silesia region, highly saline waters of the Bierawka and Kłodnica Rivers flow into the Oder. As a result, already in the area of Kędzierzyn-Koźle (80 km from the Polish-Czech border), waters of the Oder become unclassified.



In case of the Vistula, the situation is even more dramatic. At the border between the Podbeskidzie and Upper Silesia regions, the Vistula meets the class I criteria. The first brine discharge comes from the Silesia mine in Czechowice-Dziedzice. Further discharges come indirectly via the highly saline waters of the Gostynia River (where wastewater is discharged from the Wesoła mine and the Piast Excavation of the Piast-Ziemowit mine, among others) and the Goławiecki Stream (with the Ziemowit Excavation of the Piast-Ziemowit mine waters).

Due to those wastewater discharges, when the Vistula leaves Upper Silesia, its salinity is even 25 times higher than at the level directly downflow of the Goczałkowicki Reservoir; the class II limits are exceeded even 7 times. This way, along the 40-kilometre stretch alone, the Vistula turns from a clean, mountain river with springs in the Beskidy Mountains, into a sewer carrying water as salty as industrial wastewater can be.

LEGAL SITUATION

a) Acceptable concentration limits for substances particularly harmful for the environment

The primary legal act regulating industrial wastewater discharge into surface waters is the *Regulation of the Minister of Marine Economy and Inland Navigation of July 12, 2019 on substances particularly harmful to the aquatic environment and conditions to be met when introducing sewage into waters or into the ground, as well as when discharging rainwater or snowmelt into waters or into water equipment (Wastewater Regulation)*.
This regulation defines such matters as highest acceptable concentrations of pollutants in the industrial wastewater. In case of chlorides and sulphides, this limit is 1500 mg (Cl+SO4)/L. Unfortunately, this regulation introduces some exceptions.

- Wastewater that exceeds the acceptable concentration of chlorides and sulphides might still be discharged in any amount into a river, as long as the chloride and sulphide content after mixing with the river water does not exceed 1000 mg/L. As a result, the acceptable content of these substances in rivers is very high

- Under another exception, the chloride and sulphide concentration can be exceeded above 1000 mg/L in the area downstream from the wastewater discharge, if it does not cause harm to the aquatic environment and does not obstruct the use of waters by other parties

With those exceptions, it is possible to discharge wastewaters with absolutely any chloride and sulphide content. Practically every mining company makes use of this loophole. In the authorisations issued under water legislation[5], the Marshal of the Śląskie Province set very high limits of the chloride and sulphide concentrations, amounting to a dozen, or even tens of thousands of mg/L. Such limits are not acceptable for other types of industrial wastewater.

b) Water quality regulation

Surface water quality is regulated by the *Regulation of the Minister of Infrastructure of June 25, 2021 on the classification of ecological status, ecological potential and chemical status and the method of classification of the state of surface water bodies, as well as environmental quality standards for priority substances (Water Regulation)*. This regulation defines the surface water and groundwater quality classification based on their ecological status. Until the end of 2021, water quality indices under this regulation included chlorides and sulphides. When the concentration of at least one of those ions exceeded class II limits for river waters, such a river was categorised as unclassified, meaning its water quality was poor. River waters, where high-salinity industrial wastewater is discharged, reach the limits of acceptable chloride and sulphide concentrations and fail to meet the class II criteria. As a result, good ecological status of the waters cannot be achieved, which is contrary to the common environmental policy of the EU Member States.

This legal inconsistency (between the Wastewater Regulation and the Water Regulation) was seemingly eliminated on January 1, 2022 by the same *Water Regulation*, in which new types of water courses were defined together with new class I and class II thresholds. As a result, chlorides and sulphides are no longer treated as water quality indices, therefore there are currently no limits on the chloride and sulphide levels and their content is not monitored. Consequently, rivers that had not met the criteria of good ecological water condition, suddenly achieved that status. Unfortunately, this significant improvement of the water quality took place on paper only. What is more, the specific electrolytic conductivity became the only parameter to assess the river water salinity (previously it was one of several

5. Plants discharging industrial wastewater into waters are required to obtain authorisations under water legislation. Such authorisations define acceptable concentration limits of substances that may harm the environment, including chlorides and sulphides.

salinity parameters). This physical parameter depends on the concentration of chlorides and sulphides, but also other ions. Therefore, based on specific electrolytic conductivity measurements, carried out e.g. as part of the GIOŚ monitoring, it is not possible to determine the exact chloride and sulphide content in the river waters.

Wastewater Regulation, on the other hand, does not mention the specific electrolytic conductivity and this parameter is not taken into consideration in the context of authorisations under water legislation, including those issued for the hard coal mines. Those authorisations only mention chloride and sulphide concentrations in the wastewater discharged into the rivers. **There is no simple way to predict if an upcoming mine water discharge with particular chloride and sulphide concentrations will result in exceeding the class II limits in terms of the specific electrolytic conductivity of the river waters. The resulting values can only be estimated or measured after the discharge.**

c) Water Framework Directive

The Water Framework Directive determines the general framework of EU Member State water policies aimed at protecting waters from pollution. It requires the Member States, Poland included, to achieve the goal of good water quality. This goal was supposed to be achieved until the end of 2015. Nevertheless, the Directive provided for exceptions, where less rigorous environmental goals are set. Those exceptions have time limits for each river basin, with 2027 as the final deadline. Hard coal excavation permits issued to the mining companies in Poland significantly exceed that deadline. If the rivers, where mine waters are discharged, do not achieve a good environmental condition by then, Poland will face financial penalties from the EU.

d) Water management plans

Until present, the Council of Ministers of the Republic of Poland has not issued the second amendment to the Water Management Plan (PGW), which was originally expected by the end of 2021. For this reason, it is now impossible to determine the watercourse type of a given river section or its acceptable salinity limits. This constitutes a legal loophole, where there are no actual water quality limits for the Polish rivers and it is impossible to determine, whether they meet the class I or class II criteria, or are unclassified.

Due to those wastewater discharges, when the Vistula leaves Upper Silesia, **its salinity is even 25 times higher** than at the level directly downflow of the Goczałkowicki Reservoir; the class II limits are exceeded even 7 times. This way, along the 40-kilometre stretch alone, **the Vistula turns from a clean, mountain river with springs in the Beskidy Mountains, into a sewer carrying water as salty as industrial wastewater can be.**

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