
Socio-Economic Challenges of Removing and Disposing of Illegal Hazardous Waste Dumps: Poland Case Study

Submitted 10/08/23, 1st revision 21/08/23, 2nd revision 14/09/23, accepted 30/09/23

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Abstract:

Purpose: The purpose of this paper is to organize the knowledge of illegal hazardous waste sites and the pathway to disposal.

Design/Methodology/Approach: Key reports were analyzed and case studies reviewed that demonstrate the scale and challenges of removing and disposing of waste from illegal landfills.

Findings: Lack of knowledge and good practices, existing regulations and available tools often prevent municipalities from effectively addressing hazardous waste that threatens human life and health.

Practical Implications: The case study showed areas in need of change to address a problem whose scale is enormous. The introduction of good practices and effective tools is essential to carry out the task of removing and disposing of hazardous waste from illegal landfills in an effective manner (currently, it is most often not removed, or burned in fires).

Originality/Value: The work covers timely and important issues for citizens, fills the research gap in this area by combining theoretical issues with practical insights.

Keywords: Hazardous waste, illegal hazardous waste sites, environmental protection, hazardous waste fires.

JEL codes: Q53, Q58, H72

Paper type: Case study.

Acknowledgment: The project is financed within the framework of the program of the Minister of Science and Higher Education under the name "Regional Excellence Initiative" in the years 2019 - 2022; project number 001/RID/2018/19; the amount of financing PLN 10,684,000.00.

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1. Introduction

Waste production has reached the highest level in the world's history, according to the World Bank, with over two billion tons of waste discarded each year, of which at least 33 percent is not managed in an environmentally safe manner – much of it is incinerated, illegally dumped at sea or buried in unregulated landfills (The World Bank). Estimates predict that the current rate will worsen threefold by 2050, based on current consumption and disposal rates (Walters and Fuentes Loureiro, 2020).

According to the regulations, waste is any substance or object which the holder disposes of, intends to dispose of, or is obligated to dispose of (Article 3(1)(6) of the Waste Act - Dz.U. 2013 poz. 21). If waste exhibits one or more of the hazardous properties (flammability, corrosive or toxic properties) it is classified as hazardous waste (see Article 3(4) of the Waste Act for a detailed list). The properties that cause waste to be hazardous waste, and the conditions for recognizing waste as hazardous, are set forth in Commission Regulation (EU) No. 1357/2014 of December 18, 2014 (European Commission 2014) and Council Regulation (EU) 2017/997 of June 8, 2017 (European Commission 2017).

The basic rules of hazardous waste management in the European Union are contained in Council Directive 91/689/EEC of December 12, 1991 on hazardous waste (European Commission 1991). This directive refers to the essential requirements of the Waste Framework Directive (Directive 75/442/EEC of July 15, 1975 on waste - The Council of the European Union) (Skoczko 2002).

Every year, illegal dumps of hazardous waste are revealed, which due to their properties (flammability, toxicity, corrosive properties) pose a threat to human life or health and the environment. This situation is also taking place in Poland. A report by the Supreme Chamber of Control entitled Removal of Illegally Stored Hazardous Waste reveals that some such sites have not been removed for more than 5 years, and the problem is "solved" by fires of such landfills (Najwyższa Izba Kontroli 2022a). People who live in areas adjacent to landfills are usually scared and helpless, and authorities are not effective in solving this huge problem. Therefore, the purpose of this paper is to organize the knowledge of illegal hazardous waste dumps and the path of action leading to their disposal.

The rest of the paper is organized as follows: in the first section I discuss the problem of illegal landfills and show the scale of the phenomenon, then I analyze their impact on the environment. In the fourth section, I show the problems associated with the removal and disposal of illegal hazardous waste dumps, with particular attention to financial aspects. In the last part, I summarize the conclusions of the analysis and the directions of action to be taken against the problem of illegal hazardous waste dumps.

2. Illegal Hazardous Waste Landfills - The Problem and Scale of the Phenomenon

According to the Supreme Chamber of Control report, the sites of illegal hazardous waste deposition are usually inactive mines, unguarded properties, forest areas, parking lots (abandoned trailers filled with waste), garages, warehouses, etc. Due to the magnitude of the phenomenon, it should be noted that abandoned hazardous waste rarely comes from households. Usually, in such cases, we are dealing with unremoved hazardous waste left over from the end of business activities, waste illegally imported from abroad, waste handed over by successive waste holders to themselves in order to avoid bearing the costs of proper management and disposal (Najwyższa Izba Kontroli, 2022a).

The scale of the phenomenon is so large that one can speak of organized crime - Europol (European Union Agency for Law Enforcement Cooperation) has identified an increase in illegal waste shipments across borders, stimulated by economic growth and globalization. Illegal waste trafficking and sham disposal are driven by a unique "low risk - high profit" margin have become one of the fastest growing areas of organized crime.

Within the EU, according to Europol, illegal waste trafficking is particularly on the rise between the countries of Northwest and Northeast Europe - criminals take advantage of the high costs associated with legal waste management and reap significant profits from illegal trade and disposal by circumventing environmental regulations. In practice, they take advantage of a wide range of improvised illegal dumping sites, such as gravel and sand pits, abandoned industrial facilities and open-pit mines. Illegal waste disposal in the EU is organized by sophisticated networks of criminals with a clear division of roles (e.g., collection, transport, recovery or legal expertise). Affected member states are significantly affected by the ecological damage, public health risks and financial burden of recovering illegal waste sites, especially cross-border ones (Europol).

Poland lacks precise data on the number of hazardous waste landfills, as no official register of them is available. In 2022 and early 2023. The General Inspectorate for Environmental Protection (GIOŚ) recorded more than 1,502 sites where waste of varying degrees of danger was illegally dumped. The General Directorate of Environmental Protection (RDOS), on the other hand, had nearly 1,680 sites, or contaminated and polluted sites, in its records (Błaszczyk, 2023). These data do not reflect the true scale of the problem, due to the lack of an obligation to report (e.g., by municipalities) such cases, neither the Environmental Protection Inspectorate nor the Ministry of Climate and Environment has reliable knowledge in this regard.

Many European countries export waste to countries with lower environmental standards, operators exploit loopholes in the system to smuggle waste illegally into Poland. In 2018, Germany exported about 250,000 tons of waste to Poland (Bronska

2021). Poland also "receives" large amounts of garbage from France, Germany and the UK (Dundas 2021).

According to Statista (a German online platform specializing in data collection and visualization, which offers statistics and reports, market insights, consumer insights and company information), there are many illegal landfills in Europe, with more than 13,000 illegal landfills reported in Romania in 2022, the highest number in Europe (Statista 2023). Slovakia and Albania came in second and third, with 10,546 and 9,046 illegal landfills, respectively.

When addressing this topic, researchers usually look at specific cases. Valjavec, Smrekar and Zorn, in a study of illegal garbage dumps around Slovenia's capital, Ljubljana, showed that large amounts of waste are found in areas important for Ljubljana's water supply (more than 1,400 illegal garbage dumps were found in water conservation areas north of Ljubljana.) Their total area was 128,056 m², and the total volume of waste was 220,071 m³, of which 13.5% was hazardous waste - 30,000 m³) (Breg Valjavec, Smrekar, i Zorn 2016).

3. Illegal Hazardous Waste Sites, and the Environment (Cases)

Uncontrolled and poorly managed industrial and hazardous waste landfills and illegal dumps can release and emit a mixture of environmental pollutants, often unknown, that are potentially hazardous to the health of the population living near these sites (Fazzo *et al.*, 2023). Although many countries around the world face the problem of illegal waste dumps (Basel Institute on governance 2021), there are few studies in this area.

Data are estimates, and the pathways to securing and disposing of waste are not properly worked out. For example, at an illegal hazardous waste landfill at Grobli 4 Street in Stargard (Poland), mausers with liquid labeled as carcinogenic were "protected" by wrapping them in foil (photo 1), which in effect led to cracking of the mausers under the influence of weather conditions (photo 2).

As a result, dangerous substances are exposed to sunlight (increased evaporation), mix with precipitation and seep into the soil, causing irreparable damage to the environment. Neighboring residents in the area live as if they are on a ticking bomb in fear of a potential fire from these flammable substances.

Fires at hazardous waste collection sites can often involve the commission of a crime - cases of intentional or accidental arson are common, as well as situations in which the person in charge of such a facility leads by his negligence to the self-ignition of the waste, if only by improperly securing the waste or the facility itself from foreign access (Najwyższa Izba Kontroli 2022b). The smoke generated during such a fire often contains many dangerous chemical compounds. Among others, carbon monoxide, carbon dioxide, nitrous oxide, ammonia, nitrogen oxide, oxides of

sulfur, arsenic and its compounds, cadmium and its compounds, dioxins or particulate matter are released into the atmosphere.



Photo No. 1. *Mauzers with liquid labeled as carcinogenic "protected" with foil, photo taken on 13.06.2019, author of the photo - Elżbieta Ociepa-Kicińska.*

Photo No. 2. *Mauzers with liquid labeled as carcinogenic "protected" with foil, photo taken on 26.07.2023, photo author - Elżbieta Ociepa-Kicińska.*

According to an analysis by the Polish Recycling Association, the abandonment or arson of waste has most often taken place and continues to take place on local government or treasury properties. Their tenants are private companies. These companies buy waste, collect it, and when the cost of getting rid of the waste (including disposal) is too high - they abandon the landfills. They leave the problem to the property owners, who - according to the Waste Law - become the presumptive owners of the waste (EcoReporters, 2021).

In Poland, according to information provided by the State Fire Service, a number of fires have recently occurred at waste storage or warehousing sites. In 2010 there were 59 such interventions, in 2013 and 2014 about 100, while in 2016 and 2017 there were 117 and 132 interventions, respectively. In 2018, there were already about 60 fires (Ministerstwo Klimatu i Środowiska 2018). In March 2023, the Supreme Chamber of Control published a report on fires at waste collection sites, according to which 754 fires at waste collection sites, including illegal sites, occurred in Poland between 2017 and 2022.

The report said that Poland lacks cooperation between officials and firefighters, which is the main cause of fires at landfills. In 2020, mainly plastic and textile waste, as well as alternative fuels and hazardous waste, burned at waste collection sites. In isolated incidents, car wrecks, waste electrical and electronic equipment, bulky waste, municipal waste and paper and cardboard were burned (Najwyższa Izba Kontroli, 2022b).

The scale of the phenomenon and its impact on the environment is illustrated by the list of the largest hazardous waste landfill fires in Poland:

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- Municipal waste sorting plant in Warsaw, May 24, 2018. Mainly bulky waste (furniture), wood and tires, as well as baled paper and plastic waste prepared for recycling were burned. The fire was extinguished by about 40 PSP and TSO deputies, including a PSP chemical unit. It took about four hours to extinguish the fire. The Provincial Inspectorate for Environmental Protection (WIOŚ) from Warsaw conducted air quality monitoring near the site;
 - Municipal waste sorting plant in Olsztyn, May 25, 2018. The fire primarily involved bulky waste (furniture). The fire was extinguished by about 40 fire brigade and TSO units, about 90 firefighters participated in the action, extinguishing the fire lasted 16 hours, WIOŚ Olsztyn conducted monitoring of the state of the environment, soil and water samples were taken;
 - Site of illegal storage of plastic waste in Zgierz (Lodz province), May 26, 2018. The fire broke out at around 11:00 pm at a site managed by GREEN-TEC SOLUTIONS sp. z o.o. on Boruta Street, where various types of waste, primarily plastic waste, were stored. The fire was extinguished by about 60 units of the State Fire Service and TSO;
 - A fire at the hazardous waste storage site in Przylepa, Zielona Góra. The fire broke out on Saturday, July 22, 2023. The fire took over the halls with a chemical waste dump, which had previously been abandoned by the former tenant of the site. In 2019, a court ruled that the responsibility for their disposal fell on the local government, but the latter did not clean up the waste. Zielona Góra Mayor Janusz Kubicki stressed that the city had no money for such a large expense. Indeed, the disposal of the landfill was valued at 20 million zlotys. In comparison, the budget passed for 2023 is PLN 1.3 billion. A total of 376 firefighters, 107 vehicles and two aircraft took part in the entire operation at the scene of the fire.

The phenomenon of fires at waste collection sites intensified in 2018, when the Law of July 20, 2018 on Amendments to the Act on Waste and Certain Other Acts and the Law on Amendments to the Act on Environmental Protection Inspection and Certain Other Acts (Dz.U. 2018 poz. 1479) was introduced due to the need to tighten the waste management system. The new regulations were aimed at increasing oversight of entities conducting activities requiring a waste collection or processing permit, minimizing illegal practices in this area, and changes within fire protection:

- mandatory possession of claims security for entities conducting waste collection or processing;
- mandatory video inspection of waste storage or disposal sites;
- grounds for refusal by the competent authority to issue a decision on waste management in the event that the applicant is found to be in violation of regulations in this area;
- strengthening sanctions for entities repeatedly failing to comply with regulations in this area;

- introduced, among other things, the obligation to allow the facility and other waste storage sites for use, based on the opinion of the national fire department before the start of waste management activities (read more at: Najwyższa Izba Kontroli 2022b).

In August 2018, Deputy Ombudsman Sylwia Spurek addressed the issue to National Fund for Environmental Protection and Water Management (NFOŚiGW) President Kazimierz Kujda. She pointed out that the problem has become apparent especially in connection with a series of landfill fires. In May, the Deputy Ombudsman took up the issue of these fires (citizens suggest that the fires are not always accidental). The Deputy Ombudsman's conclusions show that the scale of the problem and the recurring problems of local governments in financing waste disposal make one wonder whether the tools currently in place are sufficient. After all, barriers to municipalities obtaining funding have a direct impact on their residents' right to live in a healthy environment (Biuletyn Informacji Publicznej RPO, 2018).

4. Responsibility for Removal and Disposal of Hazardous Waste

According to Article 26 of the Waste Act, hazardous waste found in a place not intended for storage or warehousing should be immediately removed and sent for management or disposal. This is the task of their holder, who, according to the polluter-pays principle, should remove the waste at his own expense. This obligation arises by law, the problem arises when the waste holder fails to comply with it. This occurs in a situation, common in Poland, i.e., when the company owning the site has declared bankruptcy, or when companies (usually with low share capital) have leased production halls/warehouses from other entrepreneurs, on which they have deposited large quantities of hazardous waste and "disappeared".

According to the law in force in Poland, in such a situation the public administration body should step in *ex officio* ordering the holder, by means of an administrative decision, to remove the illegally deposited hazardous waste. The competent administrative authority in this regard when hazardous waste is located on State Treasury land or private property is the mayor of a municipality, and when hazardous waste is deposited in property for which the landowner is a municipality - the competent regional director of environmental protection.

As the Supreme Chamber of Control points out, in the case of illegally deposited hazardous waste on private property, it is often very difficult to identify the legally obligated to remove illegally deposited hazardous waste, especially when the perpetrator of the waste abandonment remains unknown. Another problem is the effectiveness of enforcement of this obligation - administrative proceedings in this regard usually take years (Najwyższa Izba Kontroli, 2022a). In September 2019, with the amendment of the Waste Act, the legislator imposed an obligation on mayors to remove hazardous waste when the need for its immediate removal is

justified by the threat that the waste poses to human life or health or the environment (Biskup, 2020).

The delegation of this duty to mayors, mayors and city presidents, unfortunately, did not involve the provision of adequate financial resources to municipalities for their implementation (see Article 167 (1) and (4) of the Constitution of the Republic of Poland: local government units shall be provided with a share of public revenues in accordance with the tasks falling to them, and changes in the scope of their tasks and competencies should take place with corresponding changes in the distribution of public revenues). At the same time, the current legislation did not and does not ensure effective action against waste holders (owners of land where illegal landfills have been deposited).

It is the municipality's own task to dispose of municipal waste, as defined by the legislature in Article 3(1)(7) of the Waste Act. Disposal of other waste pursuant to Article 26(2) or Article 26a(1) of the Waste Act, taking into account the wording of Article 3(1pkt 7) of that Act in conjunction with Article 7(1)(3) of the Municipal Self-Government Act (Dz. U. 1990 Nr 16 poz. 95) will therefore not constitute an action in the sphere of the municipality's own tasks.

The above position is confirmed by the judgment of the Constitutional Tribunal of July 25, 2006, ref. no. K 30/042, for as indicated in the justification of that judgment: the obligation to perform the function of satisfying the needs of the local community at the level determined by contemporary civilization and cultural standards in a given state results in the fact that both the creation and performance of own tasks take place in Poland on the basis and within the limits of the competencies defined by law. Substitute execution undertaken by a municipality under Article 26a(1) of the Waste Act (emergency mode) should in turn be viewed as an action to eliminate the state of emergency, which, for the sake of the broadly understood good of the public, must be undertaken in the face of the passivity of the waste holder, but the costs of which should ultimately be charged to the holder.

The above is in line with the polluter-pays principle arising from Article 191(2) of the Treaty on the Functioning of the European Union. The substitute enforcement referred to above is therefore a legal measure taken with consequences for the obligee. At the same time, the regulation's ratio legis indicates that this type of action, although initially financed by the municipality, should not result in damage to its budget (Najwyższa Izba Kontroli, 2022a).

Theoretically, the National Environmental Protection and Water Management Fund, as part of its financial support for municipalities in the removal of abandoned hazardous waste, has implemented priority programs for this purpose, but the established rules of these programs do not cover adequate funding for the cost of waste removal. Moreover, after December 18, 2020. The Fund did not announce calls for applications for funding for the removal of abandoned waste, awaiting

recommendations from the Minister of Climate and Environment on conditions for further funding of abandoned waste projects. In addition, the NFOŚiGW significantly extended the time for processing applications for hazardous waste removal funding (relative to that set in program regulations), which may have had an impact on the lengthening of the removal process over time (Najwyższa Izba Kontroli, 2022a).

An analysis of press materials (it is the local media that most often raise the topic, the author's own experience, and the findings of the Supreme Chamber of Control are consistent on this issue - tons of hazardous waste linger illegally for years (often 6 or more years) in urban, rural and forest areas. Municipalities waste years waiting for the results of administrative proceedings against waste owners, and in the meantime the landfills start to burn.

Supreme Chamber of Control in 2022 published the results of the audit "removal of illegally stored dangerous waste", which clarified the issue related to the lack of financial tools to support the implementation of this task:

"Explaining the reasons for not announcing the call for applications for the Abandoned Waste Removal program from December 2020, the President of the National Environmental Protection and Water Management Fund said, among other things. , that after the end of the Fund's call for proposals, an analysis of the adequacy of support was undertaken to optimize the funding, taking into account the scale of needs, the Fund's financial capacity and the impact of the intervention. (...) In August 2021. The Board of Directors of the National Environmental Protection Fund, in a letter to the Minister of Climate and Environment, drew attention to the urgent need for effective solutions, including the determination of the adequate scope of participation of the National Environmental Protection Fund, indicating, among other things, that:

- it is fundamental to create opportunities for legal waste management by building new hazardous waste incinerators;
- it is necessary to create sufficient financial opportunities for the removal of waste posing a real and immediate threat to an extent that corresponds to the financial capabilities of both the relevant local governments and the supporting NFOŚiGW (the mode of Article 26a insufficiently singles out such cases). The President of the NFOŚiGW explained that in the absence of a recommendation on the conditions for further financing of abandoned waste projects, the call for applications in 2021 has not been launched."

In addition, the results of this audit showed that local government officials are looking for ways to solve the problem of illegal landfills in various ways, but these actions are ineffective. Requests from municipalities for financial assistance in removing illegally deposited waste were handled as shown in Table 1:

Table 1. Processing requests from municipalities for financial assistance in removing illegally deposited waste - cases from Poland

The Małopolska Governor informed that there was no possibility to provide such support, but applied to the Minister of Climate and Environment for funds from the general reserve from the Minister's budget, and in the face of a negative response, applied directly to the Prime Minister (negative response).
The Mazovian Governor said he had applied to the Minister of Finance for a budget increase from the special purpose reserve for the amount requested by the municipality (denied).
The Marshal of the Podlaskie Voivodeship indicated that it is possible to apply for funding from the National Fund for Environmental Protection and Water Management.
The Marshal of the Wielkopolska Region, in response to the request of the Municipality of Chod, stated that the possible provision of assistance is conditional on the Municipality taking action in the context of the procedure for substitute disposal of waste referred to in Article 26a of the Waste Act, with the possible provision of financial assistance by the Wielkopolska Region subject to repayment in the event that recovery of the cost of waste disposal by the Municipality is successful.
The Marshal of the Podkarpackie Voivodeship pointed to the wording of Article 7 of the Environmental Protection Law, where the "polluter pays" principle was defined, the significance of which is reflected in Article 191(2) of the Treaty on the Functioning of the European Union.
The Marshal of the Mazowieckie Voivodeship, in information to the Supreme Audit Office, reported that the Voivodeship Government is seeking a legal formula to provide support to municipal governments for the elimination of illegally stored or abandoned hazardous waste.
The Pomeranian Voivodeship announced that the draft adopted by the Voivodeship Board (the content of which may change as a result of, among other things, negotiations with the European Commission) of the European Funds for Pomerania 2021-2027 program provides support for projects involving the rehabilitation of areas degraded as a result of the storage of waste in places not intended for this purpose in areas under the authority of local government units.
Opole Province provided a targeted subsidy (task Financial assistance to the Municipality of Niemodlin to subsidize its own task of removing illegally accumulated hazardous waste from the area of the Municipality of Niemodlin ("Brzęczkowice") in the amount of PLN 500 thousand).
Lodz Province provided a grant for the removal of illegal landfills or abandoned hazardous waste under the Regional Operational Program of Lodz Province for 2014-2020 under Measure V.2 Waste Management, Priority Axis V Environmental Protection.

Source: Own elaboration based on *Najwyższa Izba Kontroli 2022a*.

There are also municipalities in Poland that have financed the removal of hazardous waste landfills through a resolution of the municipal council, such as the municipality of Prażmów (for more information see uchwała nr LVIII.713.2023 Rady Gminy Prażmów, 2023). The removal of hazardous waste is also usually associated with the need to issue a tender for its removal and disposal. Proper drafting of the terms of reference for such a large yet incidental order requires a great deal of knowledge on the part of those preparing the tender procedure. Unfortunately, there are no good practices or other guidelines to help in this regard.

A case study of several Polish municipalities shows that the cost of waste disposal alone usually runs into millions of zlotys. For example, in August 2023, the Częstochowa Municipal Enterprise announced a municipal tender for the removal and disposal of hazardous waste from illegal warehouses, allocating 37.7 million for this purpose, but there is an opinion that the actual cost of carrying out this task may be twice as high. Częstochowa is one of the few cities that managed to obtain a grant promise first from the National and then the Provincial Fund for Environmental

Protection and Water Management in the amount of PLN 37.7 million (Portal samorządowy 2023).

The problem with financing waste disposal is perfectly illustrated by the situation of the Rybno municipality, which in December 2020 asked the Regional Audit Office (RIO) to take a position on the municipality's financing of the cost of removing waste that meets the prerequisites of Article 26a of the Waste Act, and the preliminary estimated cost of disposing of the stored waste at the time was about PLN 10 million. The Head of Rybno Municipality, when taking action to remove and manage the waste, issued a decision specifying obligations aimed at immediate disposal of the waste, but at the time had the financial capacity to carry out the above obligation on his own.

The funds that the municipality could obtain from the National Fund for Environmental Protection and Water Management for the implementation of this task accounted for 60% of the amount needed, i.e. about PLN 6,000,000.00. The remaining amount of PLN 4,000,000.00 would be a loan to finance the planned budget for the implementation of current expenses in 2020. At the same time, by adopting a resolution on taking a long-term loan to finance planned current expenditures in the amount of PLN 4,000,000.00 for waste disposal in Jasieniec, the municipality would significantly violate the provision of Article 242 of the Public Finance Act (Dz.U. 2009 nr 157 poz. 1241) – in accordance with Article 242(1) of the Public Finance Act, the decision-making body of a local government unit may not adopt a budget in which planned current expenditures are higher than planned current revenues increased by budget surplus from previous years and free funds referred to in Article 217(2)(6) of the aforementioned Act.

The opinion of the Regional Chamber of Accounts indicated that the municipality is obliged to secure in the budget the amount necessary to fulfill its obligation. Given the estimated cost of the project. Rybno municipality should make urgent efforts to obtain external funds for its implementation. such as, for example, a grant from the National Fund for Environmental Protection and Water Management and the Voivodeship Fund for Environmental Protection and Water Management.

Another example is the Municipality of Prażmow, which reached an agreement with Nitro-Chem to remove barrels of hazardous substances from an illegal landfill in Nowy Prażmow. The councilors gave the municipality permission to start the procedure for immediate removal of the waste, but did not give permission for a loan.

The municipality wanted to spend PLN 10 million from its own coffers, although removal of the landfill could cost up to PLN 22 million. Before launching the tender, the decision of the National Environmental Protection and Water Management Fund and the municipality on financial support was crucial (Abramiuk, 2023).

Similar examples could be multiplied, but an analysis of the above few already shows how complicated the problem is. It seems that due to the scale of the phenomenon, the procedures for dealing with it should be simplified, and the very process of removing and disposing of hazardous waste from illegal landfills should not be the municipality's own task. The unresolved issue of the landowner's liability also becomes apparent - how is the landowner claimed? Shouldn't the land, which the municipality will clean up with its own funds, automatically become an asset of the municipality? How to motivate warehouse owners to monitor the situation on their land in a different way?

5. Conclusions

The reports cited in the analysis, especially those by the Supreme Chamber of Control, show that the actions of municipalities in the face of illegally deposited hazardous waste are usually not effective. Although municipalities are often able to demonstrate that they have taken lawful steps leading to a solution to the problem, in practice it turns out that they err. Submission of successive applications for action funding to institutions that do not carry out such activities may be evidence of the inaction of municipalities, but it does not lead to the key effect, in the form of removal and disposal of waste.

This raises the question of whether there is any way to protect against a situation where a company that undertakes the disposal of hazardous waste simply transports it elsewhere. At the central level, measures have been introduced to curb the practice of illegal deposition of hazardous waste, such as, for example, banning the import of hazardous waste from abroad, subjecting the import of waste to the System of Electronic Notification of Transports (SENT), creating special structures at the Environmental Protection Inspectorates (the Main and several provincial ones) to combat the deposition of hazardous waste in places not intended for storage or warehousing, or tightening penalties for environmental crimes and offenses, but these have so far not resulted in a significant reduction in this phenomenon (Najwyższa Izba Kontroli 2022a).

Simplifying the procedures, it is useful to know the results of the analysis presented in the article by Troisi, De Simone and Franco, who in the article: *Illegal firm behavior and environmental hazard: The case of waste disposal present the problem of illegal waste disposal, examining how and why it occurs, with a particular focus on illegal industrial waste disposal*. One of the key findings is that by engaging in unfair competition, companies incur lower costs compared to law-abiding firms (Troisi, De Simone, i Franco 2023).

The GIOŚ has introduced preventive measures by warning owners of land and warehouses for rent on its website against the activities of scammers and reminding that in the event that the entity that deposited the waste illegally cannot be found, the obligation to remove the waste therefore falls on the property owner, who must bear

the full cost of its disposal. "At the same time, the Chief Environmental Inspector appeals to everyone to carefully observe their immediate surroundings and immediately inform the Police and the Environmental Inspectorate of suspected illegal waste handling or illegal use of the environment. In order to facilitate the reporting of such illegal activity, a special interactive form has been created on the website of the Chief Inspectorate of Environmental Protection, which makes it easy and efficient to report, for example, an illegal landfill (<https://interwencje.gios.gov.pl/>).

All you need to do is indicate the location of the site in question and add a brief description of the report in question (possibly attaching a photo to it)" (see more at: 'Zgłoś nielegalne postępowanie z odpadami'). In practice, such notifications are forwarded by GIOŚ to the municipality where the landfill site is located, and it is up to the efficiency of local officials to determine the manner, speed and effectiveness of action. Also worthy of implementation are proposals by Europol, which, under "EnviCrimeNet" together with national experts, has developed a number of recommendations, including a particularly important one: the use of risk profiling to identify potential illegal waste dumping sites, and the adoption of a multi-agency approach during waste shipment control operations and visits to suspected illegal dumping sites, which includes relevant law enforcement agencies and environmental inspectorates, supported by regular exchanges of information between relevant police entities at the national level (Europol).

To summarize the above discussion, the cost of hazardous waste disposal is high and usually exceeds the financial capacity of municipalities. It is crucial to identify specific tools that municipalities could use here and now. Also surprising is the lack of precise information on the scale of the problem - all municipalities in the country should be reviewed and appropriate actions planned. This is particularly important because of the potential costs and lost benefits that could result from environmental disasters that follow landfill fires or the entry of hazardous substances into groundwater. Affected municipalities should be supported in all areas - legal, administrative and financial tools to solve the problem. In addition, a prevention and awareness-building program for citizens on what they should be concerned about is important.

This paper is subject to certain limitations - it analyzes mainly the problem of Poland. Extending the analysis, it is worth reviewing the solutions that are used in other countries for the prevention of hazardous waste sites and for their removal and disposal. The described problem is important and severely affects the life and health of people, so it is worth continuing research in this field.

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