

# The Elimination of Illegal Waste in Hungary: New System of Sanctions and the First Results

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Illegal dumping is a persistent environmental challenge, with limited comprehensive data collection practices across EU Member States, leading to a lack of comparative databases on this issue. This paper addresses the problem by focusing on illegal dumping in Hungary and examining the development of a digital model for monitoring these activities, along with the characteristics and sanctions related to illegal dumping. By exploring waste management practices in the Visegrad Group Member States, this paper highlights the absence of systematic data collection and presents Hungary as a case example where citizens reported over 22,000 cases of illegal dumping in just six months via the WasteRadar application. The research findings underscore Hungary's recent reforms, which introduced a nationwide database for tracking illegal dumping and imposed stricter sanctions aimed at mitigating the adverse environmental impacts of such activities. These actions signify important strides in addressing illegal dumping and improving environmental governance. This paper highlights the main characteristics of the reform of the Hungarian regulation, such as the advantages of the introduced method, such as establishing a country-wide database on illegal dumping and introducing significantly stricter sanctions on this activity to reduce the harmful environmental effects.

## 1. Introduction

In 2018, the EU generated 5.2 t of waste per inhabitant. Hungary has made significant progress in addressing illegal waste and sanctioning improper dumping practices. Hungarian environmental experts have extensively examined this topic in recent years. While not one of the major waste-producing Member States, Hungary saw a decreasing trend in waste generation from 2004 to 2007, with a sudden decline in 2008 due to methodological changes and further declines in subsequent years partly linked to the global economic crisis. Despite minor fluctuations between 2010 and 2016, the amount of waste remained essentially unchanged until an increase in 2017, followed by slightly higher amounts in subsequent years, totalling around 18-19 Mt since then. Illegal dumping continues to be a problem due to limitations on waste sorting and disposal capacity as well as high delivery costs discouraging regular disposal practices (Bándi, 2020a). Despite progress and forward-looking proposals by international regulators, illegal waste has increased significantly in certain areas over the past years. In Hungary, illegal waste comprises household mixed waste (including used equipment, furniture, toys, books, and textiles), construction and demolition waste, green waste, and plastic packaging. Hazardous materials are often found within the illegally disposed waste, which renders it unsuitable for recycling or creating high-quality secondary raw materials. Citizens seem to have an attitude of perceiving the disposal of redundant items as almost legitimate after the first act goes unpunished. Additionally, abandoned devices lead to further accumulation of waste in a short period. Notably, a significant portion of discarded items has already been deposited earlier, leading to the increased presence of abandoned wastes over time.

Chapter 2 Illegal waste is typically found in areas that are less controlled or controllable (D'Amato et al., 2018). Illegal waste dumping, however, is a deviant behaviour (Pellow, 2004) that occurs daily, as it may range from throwing away a paper tissue to the improper dumping of heavy construction waste (Laundra, 2011). On the state side, the available information, presumably only fragmentary in terms of the whole country, is available from the local governments obliged to perform road cleaning tasks, from state public service providers, and from

non-governmental organisations (Sedova, 2015). Based on these, illegal dumping of waste is most common in areas alongside roads and railways, easily accessible forests, nature conservation areas, riverbanks, and municipal boundaries (Glanville and Chang, 2015). A significant portion of the illegal waste has been deposited for some time, partly built into the soil, and a smaller portion has been newly generated. Unfortunately, we do not currently have any state records of illegal waste dumping locations. Its exact amount is very difficult to estimate. In addition, it is very important that illegal dumping, in many cases causes irreversible damage to the area where it is disposed of (Teeratitayangkul et al., 2019), so the illegal dumping frequently induces land and water contamination with hazardous substances (Triassi et al., 2015) and in the past decades, many studies have focused on the potential of illegal waste disposal to cause adverse effects on human health in this area (Tirassi, 2015). The causes of illegal waste have been investigated by several authors: it has been highlighted in these studies that the propensity to dispose of illegal waste can be influenced by avoiding the collection and disposal of waste (Choe and Fraser, 1999), the lack of appropriate waste treatment facilities (Munton, 1996), taxes (Kim et al., 2008), organised waste crime (Baird et al., 2014) and waste trade (Tompson and Chainey, 2011) and explicit control (Dorn et al. 2007) of illegal dumping (Choe and Fraser, 1999).

In recent years, Hungary has taken important steps to address the problem of illegal waste disposal, which is exacerbated by insufficient waste sorting, limited disposal facilities, and high transportation costs. However, despite global efforts and proposed regulations, illegal dumping remains a significant issue, particularly in less controlled areas like roadsides, forests, and nature reserves. The lack of comprehensive national data on illegal dumping makes it challenging to accurately measure the extent of the problem. This research is crucial as it sheds light on the growing environmental challenge of illegal waste disposal in Hungary. The paper provides an overview of the causes and impacts of illegal dumping and examines Hungary's efforts to tackle this problem, including the implementation of a national monitoring system and stronger penalties.

## **2. Materials and methods**

One of the primary deficiencies in today's official waste statistical systems is their failure to address illegal dumping and waste collection, indicators of illegal waste trade, informal waste collection results, and private-sector waste management. There is a notable scarcity of data and data sources in this area, with a complete absence of quantitative or qualitative assessment regarding trends in each country. This includes insufficient information about the quantity and types of illegally dumped waste as well as specific geographic locations for each dumping incident. However, comprehensive waste statistics are crucial at national and regional levels for effective waste management policies. Illegal waste dumping poses significant environmental risks due to its potential impact on environmental effects and toxicity associated with the disposed materials. The escalating extent of illegal waste dumping underscores its growing relevance from an environmental, legal, and social perspective (Seror, 2020).

### **2.1 Data**

While certain sources offer insight into the scale of illegal waste disposal in all EU Member States, they are often informal (e.g., initiatives led by citizens) and should not be considered a statistically representative data source. This is especially true as these initiatives depend on individual citizen participation, which may vary between countries. The illegal trade and disposal of waste pose a significant challenge for numerous countries. UNECE notes that this issue is not typically included in waste statistics. The European Environment Agency (2009) reported that annual instances of illegal shipments range from 6,000 to 47,000 t, with an average of approximately 22,000 t. This complex problem can be attributed to various factors, such as different legal definitions, category classifications, and diverse methods of data collection and management. Presently, the most comprehensive information is derived from citizen observations using digital tools and databases like the TrashOut (2022) application. However, it's important to acknowledge that data collected in this manner may not be fully representative or complete. This paper is based on data from this database and the Hungarian Waste Radar. The primary consideration in defining the study period is the revision and revalidation of the data.

### **2.2 Applied statistical methods**

This paper employed a range of statistical techniques for data analysis. Initially, descriptive statistical methods were utilised to summarise and elucidate the data, encompassing mean calculations, variance determinations, and proportion assessments. The relationship between variables was explored through Pearson correlation analysis. Multivariate analysis techniques like linear regression or logistic regression were also applied.

### 3. Results

Due to the limited availability of verified databases, international comparisons in the field of illegal waste dumping are challenging. Researchers often rely on population observations from comparative experiments. However, it is important to note that this data may not be sufficiently reliable and should only be used to gain a general understanding of the population's attitude in each examined country. The TrashOut (2022) application is a comprehensive resource available in Visegrád countries, providing an online platform for users to report illegal dumps in their surroundings. This facilitates collaboration between citizens, waste management organisations, local governments, and environmental NGOs. The study period spans from 2012 to 2021, with Figure 1 showing the aggregated value of notifications across different countries. As can be seen from the chart, Slovakia had the highest number of notifications between 2012 and 2021 (Sedova, 2016). Hungary is in second place among the member states of the Visegrád group. However, it is important to emphasise that this is not necessarily a negative indicator but rather an indication of the attitude of the population.

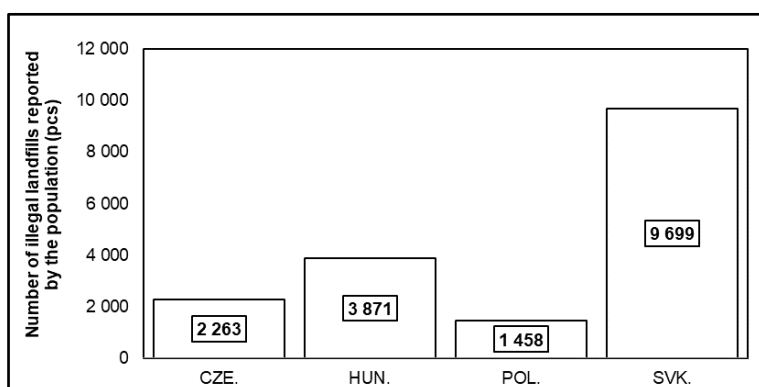


Figure 1: Total number of notifications from Visegrad Group countries between 2012 and 2021 plotted from data by (TrashOut, 2022)

It is also worth examining the distribution of values over time (Figure 2). During the investigated period, the values were in the same range except for the data for Hungary, which had an outstanding value in 2020. The reason for this is that in 2020, a jump of more than an order of magnitude can be observed in the number of illegal landfills reported among the Hungarian population. The reason for the jump can only be assumed based on the data. Consequently, the reason for the jump cannot be determined from the nature of the system. In general, there is a slightly fluctuating trend in illegal dumping in each of the Visegrad Group Member States.

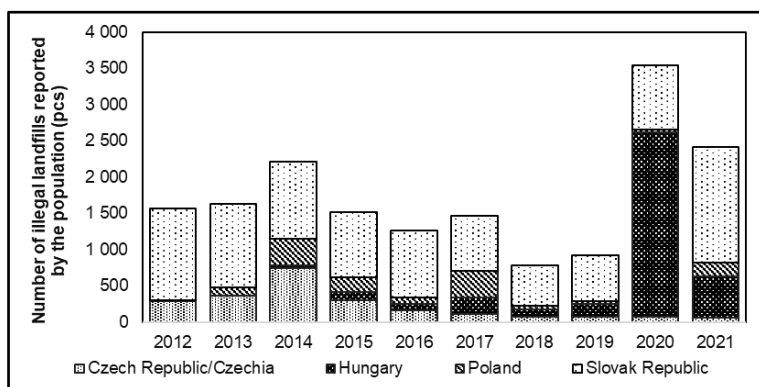


Figure 2: Number of notifications from Visegrad Group countries between 2012 and 2021, plotted using data from (TrashOut, 2022)

One of the problems with illegal waste is that it can cause aesthetic problems, but it also poses a risk to human and biosphere health due to toxicity and affects the general well-being indices. The number of landfills per 10,000 inhabitants in each country gives a detailed insight into the prevalence of this activity in each country. The source of population data is the Hungarian Central Statistical Office (KSH, 2022). Population data are the

mid-year population in 2020, expressed in millions. Based on the illegal landfills per 10,000 inhabitants, Slovakia has the highest value (17.8), followed by Hungary (3.97), the Czech Republic (2.12) and Poland (0.385). A waste reporting application called "WasteRadar" is available in Hungary to report illegal landfills. Developed by the Government Informatics Development Agency with support from the Ministry for Innovation and Technology (MGFU, 2021), it was completed at the end of 2021 and is now accessible to all citizens. The agency sends notifications to affected area owners or competent waste management authorities based on system entries. Feedback on the cleaned areas will be sent to the Ministry for Innovation and Technology. These notifications are sent on a weekly basis since the 1st of July 2021. Based on these notifications, the following values are reported between 01. July 2021 and 03. December 2021.:

- Number of notifications: 22,713;
- Number of registered users: 19,021;
- Number of illegal waste dumps exceeding 5 m<sup>3</sup>: 4,446;
- Number of notifications between 1-5 m<sup>3</sup>: 10,948;
- Used vehicle tyres are reported in 3,580 notifications
- Number of wrecked car reports: 1,700.

Also, based on the project status report of the Ministry for Innovation and Technology (MGFU, 2021), the following values can be determined: the number of notifications that were sent to the owner, manager, or trustee of the affected area was 22,347. The number of notifications sent to the managers and trustees of state territories was 5,862, of which 3,537 were sent to the state intermediate organisation named in the Government Resolution, and the remaining 2,325 notifications were received by other state organisations (e.g., National Agricultural Center, Ministry of Defense, Universities, etc.). Based on the received feedback, the cooperating organisations have transported a total of 34,254 t of illegal waste from the dump sites. Between 16 March 2021 and 31 October 2021, 16,371 t of illegal waste were shipped by involving government agencies. The number of notifications received by each cooperating organisation is illustrated in Figure 5. In total, the size of the cleaned area was 13,361.54 m<sup>3</sup> (mainly state forests) by the 28th of November 2021.

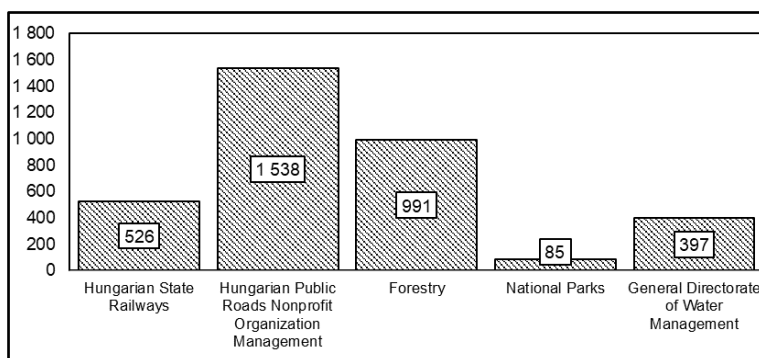


Figure 3: The number of notifications received by cooperating organisations till 03 December 2021, data from (MGFU, 2021)

In the case of Hungarian State Railways, the organisation have cleared illegal waste landfills for 316 notifications, with approximately 963,331 t of shipped waste. The Hungarian Public Roads Nonprofit Organization Management have shipped 1,217 t of illegal waste away. Forests were cleaned up of approximately 2,105.02 m<sup>3</sup> of waste till the 28th of November 2021. The collected waste amount comprised 1,492.77 m<sup>3</sup> of mixed waste, 271.80 m<sup>3</sup> of construction and demolition waste, 124.9 m<sup>3</sup> of tyres, 126.25 m<sup>3</sup> of green waste, 48.4 m<sup>3</sup> of hazardous waste, 15.90 m<sup>3</sup> of electrical and electronic waste. The remaining quantity was different kinds of additional industrial and scrap car waste categories. By the 31st of December 2021, 196 sites had been cleaned by 10 national park directorates, of which 26 sites were included in the "WasteRadar" notifications. A total of 5,258 m<sup>3</sup> of waste was shipped. The General Directorate of Water Management had collected a total of 768.8 t of mixed waste (8,562 m<sup>3</sup>) and 6.9 t (80.3 m<sup>3</sup>) of hazardous waste at 676 sites.

Illegal waste dumping often reoccurs rapidly after clean-up efforts, especially in less visible areas. This is a significant issue domestically and within many member states of the European Union. The "Let's Clean Up the Country!" project alone cannot fully address this problem as it does not prevent rapid regeneration of dumped waste. Certain locations are considered attractive for new illegal landfills, leading to quick re-dumping following clean-up initiatives. Railway stations and their immediate surroundings are generally clean, but illegally disposed waste is common in less visible areas between stations. Larger depots on the busiest railway lines often have this issue. A recurring problem for the Hungarian road management company is that rest areas are used as

landfills, especially after weekends when several m<sup>3</sup> of waste accumulate. Despite efforts by state intermediate bodies, there is still a significant amount of waste across the country and along public roads. The distribution of WasteRadar reports among state bodies indicates that most reports concerning the state belong to the Hungarian road management company. To visibly reduce illegal dumping along busy roads, it's essential to ensure that highly affected areas are consistently kept clean.

#### 4. Discussion

The "Let's Clean Up the Country!" programme has made significant progress in reducing illegal waste, but a sustainable result can only be achieved by implementing effective penalties for waste management violations and increasing official oversight of the entire waste management sector. A key principle of the circular economy is the re-entry of secondary raw materials into multiple production cycles, maximising their productivity. This concept relies on utilising recycled materials that are suitable for reintroduction into the economy. While there has been notable advancement in recycling efforts, Hungary is still striving to achieve a substantial economic breakthrough. An interesting economic criterion to consider for a sector is the proportion of generated waste to total annual GDP, i.e. the quantity of waste relative to the production of thousand EUR GDP. In 2018, this indicator ranked second best for Hungary among the Visegrad countries. Over the past fifteen years, Hungary improved by 55 %, despite being one of the worst polluters in 2004. This progress prompted legislators to establish new foundations for waste management and initiate a gradual transition to a circular economy model in Hungary.

Under this model, waste serves as raw material and goes through collection, selection, pre-processing, and recycling processes aimed at enhancing economic productivity. The entire process should be governed and monitored by appropriate state regulations. A comprehensive amendment to the Waste Management Act in Hungary aims to eliminate illegal dumping and ensure proper waste disposal and recycling. The new regulatory regime promotes the collection, sorting, and recycling of waste in a regulated manner defined by the state. The objective is to phase out illegal dumping and achieve a qualitative renewal of the economy while protecting the environment. The state will establish easily accessible local collection points in each municipality and public recycling sites where citizens can dispose of waste from their households or industrial activities. Those who engage in illegal waste management or fail to properly carry out their waste management responsibilities will face severe penalties. Strict controls will be enforced, and penalties will be imposed on individuals involved in activities such as illegal waste transport, improper performance by public service providers, or unauthorised collection of waste. This new framework aims to rationalise the development of the waste management sector and ensure a cleaner and more sustainable future in Hungary.

The foundation of the reform of the Hungarian waste management system is the transition from linear to circular economy, which entails an expansion of the administrative authority's jurisdiction to supervise the entire product value chain. The reform focuses not only on local waste management issues but also on the handling of substantial waste volumes arriving from abroad, particularly those brought by floodwaters into Hungary. A key aspect of addressing the waste management challenge involves enhancing public awareness and adopting correct waste collection practices. State funding has facilitated the establishment of accessible local collection points in every town and village, where residents can freely dispose of their sorted waste.

It has been suggested that high-traffic locations such as shopping centres and transportation hubs should offer facilities for the free disposal of certain types of waste. The legislative environment has been transformed to create a unified regulatory framework where sanctions imposed across different legal domains are cumulative, increasing their deterrent effect. Alongside the tightening of criminal penalties, there have been modifications to the systems of administrative and minor offence penalties. According to the new criminal legislation, activities such as conducting waste management without a permit or in volumes exceeding permitted levels—especially if they endanger human life, health, or the environment—can result in imprisonment for up to 3 y. The enhancement of administrative penalties mandates regulated waste removal under specific conditions, with severe financial penalties and the possibility of community service for non-compliance. An international survey conducted through Hungarian embassies indicates that EU member states employ diverse approaches to preventing and penalising illegal dumping, underscoring the importance of combining sanctions with preventive measures.

#### 5. Conclusions

This paper opens a new perspective in support of waste management by presenting a model of illegal dumping. The proposed model will allow (i) knowledge of the situation and data on illegal dumping in Europe, (ii) a known set of tools to combat illegal dumping, (iii) a possible way to explore landfills through an application, (iv) to coordinate the disposal of existing landfills through different public and non-governmental organisations; (v) to

support waste management models in each Member State. The data and knowledge about unlawful disposal of waste are insufficient.

To address this issue, several key steps should be taken: (i) Establish a clear definition: A unified legislative framework within the European Union, while respecting subsidiarity, would provide a single, legally recognised definition and a consistent approach for data management and collection. (ii) Create a single statistical category: Building on the previous point, it is important to develop a distinct indicator based on this unified definition. (iii) Develop a standardised indicator system: This system could assess illegal waste dumping by evaluating various factors such as waste quantities, costs, and penalties. The Illegal Waste Index could highlight best practices and identify gaps in waste management across countries, providing useful guidance for improvements.

This paper highlights the need for better methods to track and prevent illegal waste dumping. It proposes a comprehensive approach to improving waste management across Europe. This includes establishing unified laws and standard indicators. The goal is to increase data accuracy, streamline enforcement, and encourage cooperation among European Union countries. It is crucial for individual countries to adapt these recommendations based on their unique environmental and regulatory situations. This collaborative approach will help protect the environment and public health from the harm of illegal waste disposal, preserving natural resources for the future.

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