

Law Enforcement against Perpetrator Disposal Toxic and Hazardous Waste Not in Accordance with Management in Karawang Regency

Yuniar Rahmatiar

Universitas Buana Perjuangan, Karawang, Indonesia

Email: yuniar@ubpkarawang.ac.id

Article Info

Received:

Revised:

Accepted:

Keywords:

Law Enforcement, Toxic And Hazardous Waste, Governance, Environment, Legal Sanctions.

Abstract

Indonesia's rapid economic development is like two sides of the same coin, bringing both benefits and challenges. On one hand, economic progress contributes to overall societal welfare and prosperity. On the other hand, it has negative consequences, particularly in terms of pollution and environmental degradation. Significant environmental damage is evident in rapidly developing areas, including Karawang Regency. One major cause of pollution and environmental harm is hazardous and toxic waste, commonly known as disposal toxic and hazardous waste. Improper management of this waste poses serious risks to both the environment and public health, necessitating strict and effective handling measures.

This research aims to analyze the legal enforcement against perpetrators of improper hazardous and toxic waste disposal in Karawang Regency. It also seeks to identify the challenges and efforts involved in addressing this issue. The study employs a normative legal approach and empirical legal approach, analyzing relevant legislation, case studies, and legal documents. The findings indicate that law enforcement against improper hazardous and toxic waste disposal in Karawang Regency is crucial for preventing environmental pollution and safeguarding public health. Law Number 32 of 2009 and Government Regulation Number 101 of 2014 establish strict waste management obligations, requiring permits and imposing sanctions for violations. However, the removal of Article 102 through the Job Creation Law has weakened law enforcement efforts by eliminating criminal sanctions, potentially increasing the risk of pollution. Improper hazardous and toxic waste management can contaminate soil, water, and air, disrupt ecosystems, reduce agricultural productivity, and cause severe health issues such as respiratory disorders, organ damage, and chronic diseases. A combined approach of administrative and criminal sanctions ensures more effective law enforcement for disposal toxic and hazardous waste disposal in Karawang Regency, balancing prevention for minor violations and strict penalties for serious offenses to protect the environment and public health. These impacts underscore the importance of proper hazardous and toxic waste management and effective law enforcement to ensure environmental sustainability and public health protection.

A. INTRODUCTION

The environment is the fundamental foundation for human sustainability, which is why its protection and management must be prioritized. Environmental sustainability relies not only on public awareness in maintaining cleanliness and minimizing environmental damage but also on the active role of the government and law enforcement agencies (Judge, 2020). Both central and regional governments have yet to fully address the formulation of strategic policies to support environmental sustainability, such as waste management, natural resource conservation, and the implementation of environmentally friendly technologies. At the same time, society is expected to actively participate by taking simple actions, like reducing plastic use, planting trees, or managing household waste, as tangible contributions to environmental sustainability (Tampubolon, 2014).

However, the role of law enforcement remains crucial in ensuring environmental sustainability. Strict law enforcement against violations, such as improper waste disposal or illegal logging, is essential to create a deterrent effect for offenders (Oktora, 2023). The government needs to enhance supervision and strengthen the application of environmental sanctions to ensure consistent and effective enforcement. A synergy between society, the government, and law enforcement is key to creating a balance between development and environmental sustainability (Syapriallah, 2016). Through a collaborative approach, we can maintain a sustainable environment to support the well-being of current and future generations.

Throughout its long journey to maintain, protect, and manage the environment, the government has established several key regulations, including Law Number 32 of 2009 on Environmental Protection and Management, Government Regulation Number 101 of 2014 on the Management of Toxic and Hazardous Waste, and Ministerial Regulation Number 7 of 2014 on Environmental Damage (Sood, 2021). These regulations are designed to provide comprehensive protection to the environment from threats caused by human activities, whether individual or collective, that could harm the ecosystem. The implementation of these regulations must be supported by effective licensing supervision, strict law enforcement, and mechanisms for mitigating damage through effective compensation (Wibawa, 2016). The legal framework aims to protect the environment from large-scale ecosystem damage that could result in significant societal losses, such as land degradation, air and water pollution, and severe climate change (Keraf, 2010).

The Environmental Protection and Management Law serves as the legal framework that provides functional guidelines for environmental law enforcement through three main tracks: administrative, civil, and criminal enforcement (Husin, 2020). Among these, administrative law enforcement is considered the most important, as it focuses on preventing pollution and environmental damage. This enforcement ensures that activities with the potential to harm the environment meet administrative standards, such as waste management permits, environmental quality monitoring, and the implementation of environmentally friendly technologies (Febriyanti et al., 2021). In the context of managing hazardous and toxic waste, the government is required to process this waste in a manner that does not endanger the environment. This includes a series of activities ranging from storage, utilization, and transportation to processing and disposal of hazardous waste, in accordance with applicable regulations. The regulations governing waste disposal are clearly outlined in Article 69, paragraph (1), letters a, e, and f, and Article 104 of Law Number 32 of 2009 (Asri, 2020).

Toxic and hazardous waste refers to waste that contains dangerous and harmful substances, which can threaten human health, damage the environment, or disrupt the balance of ecosystems (Adack, 2013). Due to its hazardous nature, the management of toxic and hazardous waste must be carried out in an integrated and careful manner, beginning with waste identification, classification based on danger levels, and processing using safe methods. As such, business operators are required to manage toxic and hazardous waste appropriately. The relationship between humans and their environment is dynamic (Pavitasari & Najicha, 2020). Environmental changes can lead to physical and psychological adjustments by humans to cope with new conditions. Consequently, the government, as a regulator, must be firm in enforcing laws against those who fail to manage toxic and hazardous waste properly (Devara et al., 2021).

Strict law enforcement is essential in managing hazardous and toxic waste to ensure that all stages of its handling—such as storage, use, transportation, processing, and disposal—comply with established regulations. Toxic and hazardous waste contains dangerous and harmful substances, which, if not managed properly, pose serious risks to both human health and the environment (Wibisana, 2017). Therefore, law enforcement agencies must ensure that violations in waste management, such as improper disposal or inadequate processing, are penalized to deter future offenses (Herdinata, 2021). Additionally, consistent monitoring and the application of sanctions are crucial to prevent environmental pollution that could cause irreversible damage to ecosystems and disrupt the natural balance. Effective law enforcement also encourages businesses to implement

responsible waste management practices, thus supporting ongoing efforts for sustainable environmental conservation (Tuulima & Mahadewi, 2023).

Karawang Regency, located in West Java Province, is one of Indonesia's industrial hubs, significantly contributing to the production of hazardous and toxic waste. The intensive industrial activities in this region generate waste with the potential to pollute the environment if not managed properly and in accordance with regulations. Hazardous and toxic waste contains various harmful substances that can damage ecosystems and endanger both human health and the environment in the long term. As a major industrial center, Karawang faces significant challenges in managing hazardous and toxic waste, given the large volume of waste produced by the numerous companies operating there. Concerns over environmental pollution have grown, especially following cases of illegal hazardous waste disposal in the forests of Karawang. This incident exposed weaknesses in the oversight of hazardous and toxic waste management, as the site had been operating illegally for five years before being discovered. This situation highlights the urgent need for stricter enforcement measures and enhanced supervision to ensure that hazardous and toxic waste is managed responsibly, safeguarding ecosystems and public health.

Based on the context described, this article aims to analyze two main issues related to the management of hazardous and toxic waste in Karawang Regency: (1) how law enforcement is applied to businesses involved in hazardous and toxic waste management, and (2) the environmental impact of hazardous waste dumping practices. Academically, this research is expected to serve as a reference for studies on environmental law and hazardous waste management. Practically, it aims to assist local governments, law enforcement authorities, and businesses in understanding the importance of responsible hazardous and toxic waste management. Additionally, this research seeks to raise public awareness and encourage active participation in protecting environmental sustainability, while contributing to the development of a more sustainable waste management system to support ecosystem preservation and public health.

B. METHODS

This study employs a normative legal research method, which involves analyzing library materials as secondary data sources to examine legal issues related to the enforcement of laws governing the management of hazardous and toxic waste in Karawang Regency. This method is complemented by a descriptive-analytical approach, aiming to provide a detailed explanation of empirical facts regarding hazardous and toxic waste management while analyzing applicable legal regulations by linking legal theories with the practical implementation of those

regulations (Soekanto, 2007). This study also uses an empirical legal approach, namely comparing the legal aspects written in laws and regulations with the reality of their application in the field. In the context of law enforcement against perpetrators of disposal toxic and hazardous waste disposal in Karawang Regency, this approach is used to analyze the extent to which legal regulations, such as Law Number 32 of 2009 and Government Regulation Number 101 of 2014, are effectively implemented by law enforcement officers and their impact on waste management and environmental protection.

The research uses a statutory approach to explore and interpret relevant legal norms and an analytical approach to understand the interplay between regulations and their application in practice. The primary legal sources for this study include statutory regulations related to hazardous and toxic waste management, such as Law No. 32 of 2009 on Environmental Protection and Management and its derivative regulations, including Government Regulation No. 101 of 2014 on Hazardous and Toxic Waste Management. Secondary legal sources, such as academic studies, expert opinions, and relevant documents, are also utilized to enrich the analysis of the primary legal aspects. The legal material analysis involves categorization and interpretation processes to understand the relationships between norms in various legal provisions concerning hazardous and toxic waste management (Ariawan, 2013). The data analysis employs a deductive approach, starting from general legal principles to draw specific conclusions, such as addressing the case of illegal hazardous and toxic waste dumping in Karawang Regency. This approach enables the study to propose comprehensive solutions that align with the needs of environmental preservation and legal compliance.

C. RESULTS AND DISCUSSION

Processing Governance Proper Hazardous and Toxic Waste

The use of hazardous and toxic substances has experienced rapid growth across various sectors in Indonesia, including industry, mining, agriculture, and healthcare. While these substances play a significant role in production and operational processes, improper management can pose serious risks, such as health issues for workers, environmental degradation, economic losses, and threats to human safety (Yustina, 2021). Therefore, proper management of these substances is crucial to ensure they do not cause severe negative impacts on both humans and ecosystems. Mishandling can lead to extensive and long-term environmental pollution, ultimately endangering future generations (Effendi et al., 2023).

The importance of managing hazardous and toxic substances extends beyond industrial regulations to include occupational health and safety aspects.

Management involves several stages, such as production, transportation, storage, usage, and disposal. Each stage must be carefully handled to prevent pollution and environmental damage (Atiyah & Wibowo, 2023). All stakeholders—whether companies, government authorities, or communities—share a responsibility to implement effective preventive measures, minimize risks, safeguard public health, and support environmental sustainability. Adhering to regulations and applying precautionary principles are essential to avoid significant harm and maintain a healthy ecosystem (Muhjad, 2015).

How can hazardous and toxic substances be managed effectively, safely, and in compliance with regulations? According to Government Regulation No. 74 of 2001, several key steps must be followed by businesses and workers:

- **Registration and Notification of Hazardous and Toxic Substances**

Registration is a vital initial step in managing these materials, aimed at ensuring they are properly documented and identified within Indonesia's environmental management system. Producers or importers are required to register the substances they produce or import for the first time with relevant authorities, such as the Ministry of Environment and Forestry. This process involves submitting documents detailing the type of substance, its composition, and potential impacts if mishandled. Registration enables authorities to conduct effective monitoring of these materials, helping to prevent environmental pollution while safeguarding public health and ecosystems.

In addition to registration, notification of hazardous and toxic substances is also a crucial component of the management system. Notifications involve informing authorities about the export and import of these substances, particularly when they first enter or leave Indonesia or if the substances have restrictions that require stricter supervision. This notification is submitted through an application to the relevant authorities to ensure that the management of these materials meets the standards set by regulations, such as the Ministry of Environment and Forestry Regulation No. P.36 of 2017. This regulation highlights the importance of strict supervision over the circulation of hazardous and toxic substances to prevent any negative environmental or social impacts. It also ensures that the management of these substances is conducted responsibly and in compliance with the established provisions.

- **Creating a Material Safety Data Sheet (MSDS) in Toxic And Hazardous Management**

The Material Safety Data Sheet (MSDS) is a critical document in the management of hazardous materials because it provides comprehensive information about the physical and chemical properties of the substances, as well as the potential

dangers they pose. The MSDS serves as a safety guideline that must be followed by workers and relevant parties involved in the handling, storage, transportation, and use of dangerous chemicals. This document includes details about the material's characteristics, such as trade name, chemical formula, and the categories and risks associated with the substance. Additionally, the MSDS outlines preventive measures to reduce potential hazards and provides instructions for safe handling in emergency situations, such as spills, leaks, or accidental exposure.

According to relevant regulations, such as those established by the Occupational Safety and Health Administration (OSHA) in the Hazard Communication Standard 29 CFR 1910.1200, manufacturers of hazardous chemicals are required to prepare and provide MSDS for their products. This ensures that all parties involved in the distribution of hazardous materials—from factories to distributors to end users—have access to complete and accurate information. The MSDS is essential for workplace safety in environments where hazardous materials are used and for protecting the environment from the potential risks associated with these substances. The document should include detailed procedures for handling emergencies, such as spills or leaks, to ensure quick and effective actions are taken to minimize risks of accidents or damage.

- **Transportation of Hazardous Materials**

Transportation of hazardous materials is a crucial stage in the management process, requiring special attention to ensure the safety of both humans and the environment. Vehicles used to transport hazardous substances must meet strict safety standards that are appropriate to the type and characteristics of the materials being carried. This is to prevent leaks, accidents, or contamination that could harm the environment or public health. Vehicle standards should address various aspects, such as spill protection and fire risks, to ensure safe transportation.

Furthermore, the drivers and assistant drivers of these vehicles must have special qualifications. They must undergo training that covers the handling of hazardous materials, road safety procedures, and emergency response protocols. This ensures that all stages of the transportation process are conducted correctly, from departure to the delivery of hazardous materials to their designated destination. The assistant driver plays a vital role in supporting the driver to ensure the transportation process is smooth and safe.

The selection of transportation routes is another critical factor. Routes should be chosen with consideration for road conditions, the risks posed by the materials being transported, and the vulnerability of the environment. It is advisable to avoid transporting hazardous materials through busy residential areas or regions with high environmental sensitivity. Additionally, the vehicle should be able to travel

safely on the chosen route while carrying the hazardous materials. Hazardous materials can be transported in bulk or non-bulk forms, requiring appropriate packaging and vehicles to prevent leaks or contamination. Regulations governing these practices are outlined in various standards, such as the Director General's Decree on Land Transportation, which ensures that hazardous material transportation follows safe and proper procedures.

- **Packaging Hazardous and Toxic Waste**

Packaging of hazardous materials is a critical step that must be carried out with great care and proper classification to ensure safety during distribution and storage. Correct packaging standards, along with clear danger symbols and labels on each package, are essential for the swift and accurate identification of potential hazards. This enables parties involved in the distribution and storage of hazardous materials to understand the risks and take necessary precautions to protect both human health and the environment. With clear labeling, the management and handling of hazardous materials become safer and more organized, reducing the likelihood of accidents.

The regulations governing the packaging, labeling, and provision of Material Safety Data Sheets (MSDS) are outlined in the Minister of Environment Regulation No. 3 of 2008. This regulation provides detailed guidelines on packaging specifications, hazard symbols, and important information that must be included on the labels. It ensures that everyone involved in hazardous materials management, from manufacturers to end users, has access to the required information for safe handling. Additionally, the regulation specifies the procedures to follow if the packaging of hazardous materials is damaged. In cases where the packaging is damaged but the hazardous material can still be re-packaged, the distributor must act promptly. However, if the packaging is compromised and the hazardous material poses a risk of pollution or danger, the distributor must take immediate countermeasures to prevent further harm.

Law Enforcement against Perpetrator Disposal Toxic and Hazardous Waste Not in Accordance with Management in Karawang Regency

Crimes occurring within society, the nation, and the state often present significant challenges in law enforcement efforts. The primary goal of law enforcement is to restore order and security in the face of various violations, while also ensuring legal certainty for the public (Waluyo, 2022). In the context of a rule of law state, law enforcement is expected to create a safe and orderly environment, allowing people to live their lives in peace. Therefore, the actions taken to address and prevent crime are crucial for maintaining social, economic, and political stability

(Rahardjo, 2010).

According to Lawrence M. Friedman (2005), the success of law enforcement is influenced by three main interrelated factors, namely legal structure, legal substance, and legal culture. Legal structure refers to institutions or agencies tasked with enforcing the law, such as the police, prosecutors, and courts, which have an important role in ensuring that established rules can be implemented effectively. Without a strong and integrated structure, the law enforcement process will experience obstacles, both in terms of investigation, prosecution, and execution of decisions. Legal substance refers to the applicable rules, including laws and regulations that regulate obligations, prohibitions, and sanctions for violators of the law. The accuracy and clarity of legal substance greatly determine the effectiveness of law enforcement, because ambiguous or overlapping laws can weaken the enforcement process. Meanwhile, legal culture reflects the public's awareness and compliance with the law, which plays a role in creating an environment conducive to rule enforcement. If the public and law enforcement officers have a good legal culture—respecting the law and enforcing it fairly—then the effectiveness of law enforcement will increase.

Every entity, including industry in Karawang Regency, must comply with legal provisions related to waste disposal. The state has an obligation to ensure that laws not only exist but are also effectively enforced. Unfortunately, weak law enforcement and reduced levels of legal sanctions have created loopholes for industry to ignore good waste management. The need for clear and enforceable regulations. The weakening of legal provisions due to policy changes has created uncertainty for industry regarding their responsibilities. Without firm and consistent law enforcement, companies tend to prioritize profits over environmental sustainability.

In this regard, the 2009 Environmental Law provides clear guidance on addressing pollution and environmental damage. It contains provisions that regulate effective methods for reducing and restoring polluted conditions. Some of the countermeasures include distributing information about the potential risks and impacts of pollution to the public as an early warning, helping them stay alert and prevent further damage (Renggong, 2018). Additionally, actions like isolating and terminating pollution sources are essential to optimizing environmental recovery efforts. Equally important is the advancement of knowledge and technology, which plays a vital role in designing and implementing more efficient solutions for addressing pollution and repairing environmental damage in a sustainable manner (Samedi, 2015).

Law enforcement is a key step in raising public awareness about the proper

management of hazardous and toxic waste (Maulana, 2020). The 2009 Law on Environmental Protection and Management provides a strong legal foundation for regulating the management of hazardous and toxic waste, including sanctions for violators. Article 59, paragraph (4) of this law clearly states that any activities involving the management of hazardous and toxic waste must first obtain permission from the relevant authorities, such as the Minister, Governor, or Regent/Mayor, depending on their jurisdiction. This ensures that hazardous and toxic waste management is carried out according to appropriate procedures, preventing environmental pollution and damage that could harm human health and ecosystem sustainability.

Article 60 of the 2009 Law on Environmental Protection and Management strictly prohibits the disposal of waste and/or materials into environmental media. To ensure waste disposal is done in a controlled manner and does not cause environmental harm, there are several provisions that regulate this practice. First, waste disposal can only occur after receiving approval from the central government. Second, waste disposal is only allowed in designated locations authorized by the competent authority. Further provisions regarding the procedures, methods, and requirements for waste disposal are detailed in government regulations, which aim to ensure that the necessary steps are followed to prevent environmental pollution and widespread ecosystem damage.

The regulation concerning waste disposal actions in Law Number 32 of 2009 regarding Environmental Protection and Management is clearly outlined in Article 69, paragraph (1). It prohibits several actions, such as in letter (a), which bans activities that could result in pollution or environmental destruction; in letter (e), which prohibits the disposal of waste into environmental media; and in letter (f), which specifically forbids the disposal of dangerous and toxic materials, as well as hazardous waste, into environmental media. Additionally, the law stipulates penalties for waste dumping without permission in Article 104, which imposes criminal punishments of up to three years in prison and fines up to 3 billion rupiahs. This regulation underscores the importance of obtaining valid permission from the relevant authorities before disposing of waste into the environment and enforces strict sanctions to ensure that waste management is conducted in a manner that does not harm the environment or public health.

Article 102 of the previous Law Number 32 of 2009 was a key provision governing the management of hazardous and toxic waste in Indonesia. Its aim was to protect environmental quality and prevent the unauthorized disposal of hazardous waste. This article imposed criminal penalties, including prison sentences of 1 to 3 years and fines of up to 3 billion rupiahs for those who improperly

disposed of hazardous waste. However, with the enactment of the Omnibus Law (Job Creation Law), Article 102 was removed, meaning that managing hazardous waste without permission is no longer considered a criminal offense. This change potentially creates a loophole, allowing hazardous waste management to occur without legal consequences, which raises concerns about the protection of the environment and the possible increase in pollution due to uncontrolled waste management practices.

The removal of Article 102 through Law Number 6 of 2023, which is part of the Omnibus Law, has significant consequences, particularly the loss of criminal sanctions for unauthorized hazardous waste management. Although permits are still required, the elimination of criminal penalties weakens the enforcement of laws against illegal hazardous waste management, creating a legal gap and increasing the risks of pollution and environmental damage. This change could undermine efforts to protect the environment due to the lack of clarity in sanctions for violations involving unauthorized hazardous waste management.

Finally, as a derivative regulation of the Environmental Protection and Management Law, the enforcement of laws against perpetrators of hazardous waste disposal is also governed by Government Regulation Number 101 of 2014, concerning the management of hazardous and toxic waste. According to Article 1, number 18 of this regulation, a "Processor" of hazardous and toxic waste refers to business entities authorized and licensed by the government to manage hazardous waste. These entities are responsible for processing waste, such as electronic waste, produced by companies or industries that are unable to handle it themselves. The processing of hazardous waste is crucial for maintaining environmental sustainability and public health. If hazardous waste is disposed of without permission, the perpetrator may face severe legal sanctions, including up to three years in prison and fines up to 3 billion rupiahs. This confirms the importance of proper hazardous waste management in compliance with applicable regulations to prevent negative impacts on the environment and society.

Improper disposal of hazardous waste burdens local communities with environmental degradation and health risks, while industry continues to profit economically. Effective law enforcement ensures that justice is served by holding polluters accountable and protecting the rights of affected communities. Allowing industry to dispose of hazardous waste carelessly benefits only a few parties, while the wider community suffers from environmental and health impacts. Therefore, strict enforcement of environmental regulations will maximize overall social welfare by preventing health risks and ecological damage.

To improve the effectiveness of law enforcement for perpetrators of disposal

toxic and hazardous waste disposal in Karawang Regency, a combination of administrative and criminal sanctions is the most optimal approach. This combination aims to provide a deterrent effect on perpetrators while ensuring compliance in disposal toxic and hazardous waste management. Administrative sanctions are used as an initial step to handle minor to moderate violations, while criminal sanctions are applied to serious violations that have a broad impact on the environment and public health.

Administrative sanctions are applied to violations that can still be corrected without the need for more severe legal intervention. For example, if a company does not comply with the established disposal toxic and hazardous waste management procedures, such as not having an adequate waste treatment system or disposing of waste without a permit but on a small scale, then administrative sanctions can be given. The form of this sanction can be in the form of a fine, written warning, or revocation of a business license if the violation is repeated. The advantage of administrative sanctions is that the process is faster and more flexible compared to criminal sanctions, because it can be directly applied by authorized agencies such as the Environmental Service without the need for a long court process. Thus, law enforcement can be more effective in preventing environmental pollution due to disposal toxic and hazardous waste from the early stages.

If the violation committed is serious and causes large-scale environmental pollution or has an impact on public health, then criminal sanctions must be applied. For example, if an industry intentionally dumps hazardous disposal toxic and hazardous waste into a river or land without proper processing, thus polluting groundwater and causing health problems for local residents, then this action must be subject to criminal penalties. Criminal sanctions have a stronger deterrent effect because they can be in the form of imprisonment and large fines. The application of these sanctions aims to take firm action against perpetrators who consciously and repeatedly commit violations without regard to their impact on the environment and society. With the threat of criminal penalties, business actors will think twice before committing violations, so that compliance with environmental regulations can increase.

Impact Disposal Toxic and Hazardous Waste That Does Not Comply with Environmental Management

Disposal Hazardous and Toxic Materials waste that is not according to governance can cause impact negative for environment life , including :

Land Pollution

Improper disposal of hazardous and toxic waste can have severe

environmental consequences, one of which is land pollution. Hazardous and toxic waste often contains harmful chemicals that, if discarded irresponsibly, can seep into the soil. This process can occur through percolation or infiltration, where dangerous substances penetrate the soil layers, contaminating the land's components. As a result, the land's fertility declines, reducing its ability to support plant life, which in turn affects agricultural productivity.

The toxic chemicals in hazardous waste, such as heavy metals, pesticides, and industrial chemicals, can alter the physical, chemical, and biological characteristics of the soil. For instance, heavy metals like mercury and lead can bind to soil particles and settle deeper into the soil, disrupting the soil's pH balance and depleting essential nutrients required for plant growth. Polluted soil also loses its ability to filter and treat water, leading to a decline in groundwater quality and an increased potential for erosion. Over time, this renders the land less suitable for farming, potentially leading to long-term crop failures.

In agriculture, soil pollution from hazardous waste threatens the sector's sustainability. As soil quality declines, plant growth is disrupted due to a reduction in nutrient availability, damage to plant root systems, and direct poisoning of plants. This can lead to lower agricultural yields and significant economic losses for farmers. Agriculture, being highly dependent on soil fertility, is particularly vulnerable to soil pollution, which can ultimately jeopardize national food security. Therefore, proper management of hazardous and toxic waste is critical to preserving environmental sustainability and the agricultural sector, ensuring that land remains usable for future generations.

Water Pollution

The disposal of hazardous and toxic waste into water sources such as rivers, lakes, or seas can result in serious environmental damage, particularly water pollution. Hazardous and toxic waste often contains chemicals that are highly toxic to aquatic organisms, including fish, aquatic plants, and microorganisms. When such waste is irresponsibly disposed of into water bodies, these chemicals can degrade water quality, making it unfit for sustaining aquatic life that depends on oxygen and balanced chemical conditions.

One major impact of water pollution from hazardous waste is the death or extinction of aquatic organisms. Some dangerous chemicals in toxic waste, such as heavy metals like lead and mercury, can accumulate in aquatic organisms through bioaccumulation. This disrupts their respiratory, digestive, and metabolic systems, damaging their gills, reducing oxygen absorption, or poisoning their tissues. As a result, fish and other aquatic organisms may die in large numbers, disrupting aquatic ecosystems and reducing biodiversity.

Additionally, hazardous waste entering water bodies can produce other harmful compounds, such as organic acids and methane gas. Organic acids can lower the water's pH, making it more acidic, which is detrimental to aquatic life. Such drastic pH changes can disrupt the water ecosystem balance, endangering species survival and damaging their natural habitats. Methane gas released from the waste further deteriorates water quality by increasing greenhouse gas emissions, potentially impacting climate conditions and water body health. Therefore, strict supervision and prohibition of hazardous waste disposal in water bodies are necessary to protect aquatic ecosystems and ensure the sustainability of life within them.

Air Pollution

Improper disposal of hazardous and toxic waste into the air can lead to dangerous air pollution, posing significant risks to both human health and the environment. Industrial waste that contains toxic chemicals, such as heavy metals, asbestos, or volatile organic compounds, can evaporate and release harmful particles or gases into the atmosphere. This air pollution increases the concentration of dangerous substances in the air, which not only degrades air quality but also heightens the long-term health risks for communities living near disposal sites.

One of the primary effects of air pollution from hazardous waste is respiratory system damage. Toxic substances, such as heavy metals (e.g., lead and mercury), can enter the body through inhalation and accumulate in vital organs like the lungs and kidneys. Long-term exposure to polluted air can lead to various health issues, ranging from respiratory irritation, asthma, and bronchitis to chronic lung diseases and even cancer. Vulnerable groups, including children, the elderly, and individuals with pre-existing respiratory conditions, are especially at risk from the harmful effects of air pollution.

In addition to its direct impact on the respiratory system, air pollution can also affect overall quality of life. Polluted air from hazardous waste can lead to decreased energy levels, fatigue, sleep disturbances, and even mental health issues, such as stress and anxiety caused by an uncertain environment. Some compounds released during the disposal of hazardous waste, such as toxic gases in industrial smoke, can damage the central nervous system and cause neurological disorders. If not addressed properly, these long-term effects can increase the prevalence of environmentally related diseases and diminish the overall quality of life for affected populations. Therefore, proper waste management and strict law enforcement are essential to protect public health and the environment.

Health Impacts

Hazardous and toxic waste poses significant risks to human health, both in

the short and long term. Exposure to dangerous substances in toxic waste, such as heavy metals, industrial chemicals, and other toxic compounds, can lead to serious health conditions, including cancer. For example, long-term exposure to benzene, which is commonly found in industrial waste, increases the risk of leukemia. Similarly, carcinogenic compounds like formaldehyde and asbestos can contribute to the development of cancer in various organs, including the lungs, liver, and colon. Improper management of hazardous waste can therefore result in a higher incidence of cancer and other pollution-related health issues.

In addition to cancer, hazardous waste can cause damage to vital organs, such as the kidneys and liver. Many chemicals found in toxic waste are toxic to these organs and can impair their functions. For instance, exposure to lead or mercury, often present in electronic waste and other industrial materials, can damage the kidneys and liver. Over time, this damage can lead to chronic kidney disease or kidney failure, requiring intensive medical treatment. Similarly, compounds like arsenic and cadmium found in hazardous waste can worsen health conditions and disrupt the functions of other organs, including the nervous and respiratory systems.

Exposure to hazardous waste can also cause immediate health effects. Short-term symptoms can include skin and eye irritation, inflammation of the respiratory tract, dizziness, and fatigue. Harmful substances like hydrochloric acid, ammonia, and other toxic gases can irritate the skin and mucous membranes, while inhaling dangerous chemicals can disturb the respiratory system, leading to coughing and shortness of breath. Additionally, exposure to toxic chemicals can affect the central nervous system, causing dizziness, nausea, and excessive tiredness. These examples highlight the importance of proper management of hazardous waste to prevent adverse health effects on the public.

D. CONCLUSION

Effective management of hazardous and toxic materials waste requires collaboration between companies, government, and society to protect human health and ensure environmental sustainability. Key steps include proper registration and notification, preparation of Material Safety Data Sheets (MSDS), safe packaging with clear labeling, and transportation that adheres to safety standards. Compliance with regulations such as Government Regulation No. 74 of 2001 and the Minister of Environment's Regulation ensures that each stage of hazardous waste management is conducted with care to minimize pollution risks and environmental damage. The enforcement of laws against improper disposal of hazardous waste is critical in regions like Karawang Regency to prevent environmental pollution and protect

public health. Law Number 32 of 2009 on Environmental Protection and Management, along with Government Regulation No. 101 of 2014, provides a clear legal framework, including the requirement to obtain management permits for hazardous waste and imposing strict penalties such as imprisonment for up to three years and fines of up to IDR 3 billion. However, the removal of Article 102 through the Job Creation Law weakens enforcement efforts by removing criminal sanctions for unlicensed hazardous waste management, creating legal gaps and increasing the risk of pollution. The combined approach of administrative and criminal sanctions in law enforcement for perpetrators of disposal toxic and hazardous waste disposal in Karawang Regency is a more effective strategy than relying on only one form of sanction. Administrative sanctions act as preventive and corrective measures for minor to moderate violations, while criminal sanctions are a more assertive law enforcement tool for serious violations that have a major impact. With the implementation of this strategy, it is hoped that disposal toxic and hazardous waste management in Karawang Regency can be more orderly, so that the environment and public health are maintained. Improper disposal of hazardous and toxic waste has serious environmental and health consequences, including land, water, and air pollution, which can harm ecosystems, reduce agricultural productivity, and threaten the sustainability of natural resources. Hazardous waste contains toxic substances, such as heavy metals and industrial chemicals, which can harm aquatic life, degrade water quality, and cause long-term environmental damage. Additionally, air pollution caused by hazardous waste can lead to respiratory issues, organ damage, and chronic diseases like cancer. These impacts not only harm the environment but also pose a significant threat to public health, underscoring the importance of proper waste management and law enforcement to protect both the environment and human health in a sustainable manner.

REFERENCES

- Adack, J. (2013). Dampak pencemaran limbah pabrik tahu terhadap lingkungan hidup. *Lex Administratum*, 1(3).
- Ariawan, I. G. K. (2013). Metode Penelitian Hukum Normatif. *Kertha Widya*, 1(1).
- Asri, A. (2020). Pertanggung Jawaban Pidana Terhadap Pelaku Dumping Limbah B3 Berdasarkan Undang-Undang Nomor 32 Tahun 2009 Tentang Perlindungan Dan Pengelolaan Lingkungan Hidup. *Jurnal Ilmiah Hukum Dirgantara*, 10(1).
- Atiyah, Y., & Wibowo, E. K. (2023). Penerapan Keselamatan dan Kesehatan Kerja Pada Pegawai Saat Pandemi Covid-19 di Rumah Sakit Jantung dan Pembuluh Darah Harapan Kita. *Jurnal Sumber Daya Aparatur*, 5(2), 61-81.
- Devara, E., Priyanta, M., & Adharani, Y. (2021). Inovasi Pendekatan Berbasis Risiko

- Dalam Persetujuan Lingkungan Berdasarkan Undang-Undang Cipta Kerja. *LITRA: Jurnal Hukum Lingkungan, Tata Ruang, dan Agraria*, 1(1), 101-116.
- Efendi, N. H., Rato, D., & Soetijono, I. R. (2023). Prinsip Kehati-Hatian Dalam Pengelolaan Limbah Medis Untuk Mewujudkan Kehidupan Yang Berkelanjutan. *DiH: Jurnal Ilmu Hukum*, 146-155.
- Febriyanti, D., Aini, S. N., Resta, A. V., & PKP, R. B. (2021). Fungsi AMDAL Dalam Pengendalian Kerusakan dan Pencemaran Lingkungan Setelah Diundangkannya UU Cipta Kerja. *Widya Pranata Hukum: Jurnal Kajian Dan Penelitian Hukum*, 3(2), 115-133.
- Friedman, L. M. (2005). *A history of American law*. Simon and Schuster.
- Hakim, E. R. (2020). Penegakan Hukum Lingkungan Indonesia Dalam Aspek Kepidanaan. *Media Keadilan: Jurnal Ilmu Hukum*, 11(1), 43-54.
- Herdinata, B. S. F. (2021). Penegakan Hukum Pidana Perkara Limbah B3 (Bahan Berbahaya Beracun) yang Masih dalam Proses Perpanjangan Izin. *Banua Law Review*, 3(1), 67-86.
- Husin, S. (2020). *Penegakan Hukum Lingkungan: Edisi Revisi*. Sinar Grafika (Bumi Aksara).
- Keraf, A. S. (2010). *Etika lingkungan hidup*. Penerbit Buku Kompas.
- Maulana, A. (2020). Penegakan Hukum Lingkungan Pidana Terhadap Perusahaan yang melakukan dumping limbah bahan berbahaya dan beracun (limbah B3). *Lex Administratum*, 8(5).
- Muhjad, M. H. (2015). *Hukum Lingkungan Sebuah Pengantar Untuk Konteks Indonesia*.
- Oktora, N. D. (2023). Peranan Pemerintah Terkait Kerusakan Lingkungan Hidup Di Tinjau Dari Aspek Administrasi. *Siyasah Jurnal Hukum Tatanegara*, 3(2), 160-177.
- Pavitasari, K. K., & Najicha, F. U. (2022). Pertanggungjawaban Pihak Ketiga Jasa Pengolah Limbah B3 dalam Mengelola Limbah B3. *Tanjungpura Law Journal*, 6(1), 78-92.
- Rahardjo, S. (2010). *Penegakan hukum progresif*. Penerbit Buku Kompas.
- Renggong, R. (2018). *Hukum Pidana Lingkungan*. Kencana.
- Samedi, S. (2015). Konservasi Keanekaragaman Hayati Di Indonesia: Rekomendasi Perbaikan Undang-Undang Konservasi. *Jurnal Hukum Lingkungan Indonesia*, 2(2), 1-28.
- Soekanto, S. (2007). Penelitian hukum normatif: Suatu tinjauan singkat.
- Sood, M. (2021). *Hukum Lingkungan Indonesia*. Sinar Grafika.
- Syapriallah, A. (2016). Penegakan hukum administrasi lingkungan melalui instrumen pengawasan. *Bina Hukum Lingkungan*, 1(1), 99-113.
- Tampubolon, S. M. (2014). peran pemerintah dalam upaya pemberantasan korupsi kaitannya dengan undang-undang no. 32 tahun 2004. *Lex et Societatis*, 2(6).

- Tuulima, V. A., & Mahadewi, K. J. (2023). Regulasi Dan Implikasi Hukum Terkait Pelanggaran Pengelolaan Limbah B3: Studi Kasus Pembuangan Limbah Sludge Di Desa Darawolong, Karawang. *Jurnal Dimensi Hukum*, 7(12).
- Waluyo, B. (2022). *Penegakan hukum di Indonesia*. Sinar Grafika.
- Wibawa, I. P. S. (2016). Politik Hukum Perlindungan dan Pengelolaan Lingkungan Menuju Ekokrasi Indonesia. *Kanun Jurnal Ilmu Hukum*, 18(1), 51-68.
- Wibisana, A. G. (2017). Campur Tangan Pemerintah dalam Pengelolaan Lingkungan: Sebuah Penelusuran Teoretis Berdasarkan Analisis Ekonomi atas Hukum (Economic Analysis of Law). *Jurnal Hukum & Pembangunan*, 47(2), 151-182.
- Yustina, E. W. (2021). Aspek hukum pengelolaan limbah medis pada fasilitas pelayanan kesehatan dan perlindungan terhadap kesehatan lingkungan. *Jurnal Paradigma Hukum dan Pembangunan*, 6(1), 98-115.
- .