

Legal and environmental responsibility towards justice in industrial pollution

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Abstract: Industrial pollution is a pressing environmental challenge of our time. It has profoundly impacted ecosystems, human health, and quality of life. This study delves into the realms of legal responsibility and environmental justice in the context of pollution stemming from industrial activities. The research aim is to identify and analyze effective legal and policy approaches to handle and tackle this issue. The research method employed is a literature review, scouring for references pertinent to the research context. It used secondary data, which are data available to the public. Data were obtained using industrial pollution as the main keyword, in addition to legal and environmental responsibilities. The findings underscore not only the significance of stringent law enforcement but also highlight the pivotal and empowering role of community participation in the decision-making process. The industry is called upon to demonstrate transparency and accountability. The research further underscores the need for a comprehensive and collaborative approach involving multiple disciplines and sectors to devise sustainable solutions that safeguard the environment while fostering economic growth. It concludes that achieving environmental justice and legal responsibility in the context of industrial pollution necessitates a blend of innovative policies, bolstered community capacity, and enhanced cross-border cooperation.

Keywords: law; legal responsibility; environmental justice; industrial pollution

1. Introduction

In the current era of rapid industrial development and globalization, the detrimental effects of environmental pollution, primarily caused by industrial activities, have escalated into a critical global issue. The hazardous gas emissions, toxic waste, and water pollution originating from these industries not only disrupt the environmental ecosystem but also pose severe health risks to the communities residing in these industrial areas. Industrial pollution is not just a significant issue, it's a pressing crisis that demands immediate and concerted action due to its direct and detrimental impact on the environment and public health. The uncontrolled release of a myriad of pollutants, including greenhouse gases, toxic wastewater, and particulates, is leading to water, soil, and air quality degradation. Improperly treated industrial effluents can contaminate water sources, making them unsafe for consumption or use for irrigation (Bashir et al., 2020). Air pollution from factory fumes and heavy vehicles also increases the risk of respiratory, cardiovascular, and cancer diseases among neighboring communities. In addition, noise and vibration pollution from factory operations negatively impact the mental and physical health of local residents. This pollution not only affects the immediate well-being of individuals but also damages ecosystems, reduces biodiversity, and disrupts natural cycles (Rao and Yan, 2020).

Besides directly harming the environment and public health, industrial pollution

has significant economic consequences. The degradation of natural resources can potentially hamper other economic sectors, such as agriculture, fisheries, and tourism, which rely on the cleanliness and fertility of the environment (Ukaogo et al., 2020). This creates a cycle of poverty among communities that depend on these natural resources. Furthermore, health costs due to industrial pollution become an economic burden for communities and governments (Muhammad et al., 2020). Therefore, the discussion on the industry's responsibility in managing waste and minimizing pollution's impact is relevant from an environmental perspective but also important for the socioeconomic sustainability of the community. A comprehensive and multifaceted approach, which includes regulatory aspects, technological innovation, and public awareness, is needed to address this issue (Song et al., 2020).

Applying legal aspects to environmental issues is essential as a basis for protecting people's rights and preserving the environment. Strong regulations and effective supervision ensure that companies and industries are responsible for minimizing the impact of pollution and complying with established environmental standards (Bell et al., 2013). Environmental laws play a role in setting limits on pollutant emissions, regulating waste management, and requiring environmental impact assessments before implementing certain projects. However, it is not enough to have rules, and strict law enforcement is also needed to ensure their effectiveness (Beyerlin and Marauhn, 2011). Through legal mechanisms, victims of environmental pollution can demand compensation and remedy from the responsible parties. Fair and consistent application of the law helps prevent pollution, ensure sustainable development, and provide legal certainty for all parties involved (Gillespie, 2014).

The existence of justice aspects in environmental issues emphasizes the importance of fair distribution of environmental benefits and burdens among all members of society. The principle of environmental justice ensures that no group of people or region disproportionately bears the negative burden of the impacts of industrial activities (González, 2023). Vulnerable groups and communities with limited resources should not be left to deal with environmental problems without access to legal channels for defense or compensation. Through the implementation of environmental justice, it is hoped that a system based on equality is created, where every party has the ability to participate in decision-making actively and has equal access to resources to deal with environmental challenges (Lazarus, 2023). This is important not only to ensure the sustainability of a healthy environment but also to maintain social harmony and create a sustainable society.

However, reality often shows that applying legal responsibility is ineffective, and environmental justice remains elusive (Orts, 2019). This is due to many factors, including weak regulation and supervision, lack of awareness and understanding of environmental law, and challenges in effective law enforcement (Plater et al., 2016). On the other hand, the principle of environmental justice, which emphasizes the equal right to a good and healthy environment for all individuals, is often overlooked. Communities living in areas closest to industries are generally the most vulnerable to the negative impacts of pollution, yet ironically, they often have the most limited access to justice (Yang and Percival, 2009).

Given these conditions, research on legal responsibility and environmental justice in the context of industrial pollution is highly relevant. Based on the hypothesis, this

study aims to investigate the application of current environmental law in the field and further evaluate whether the principles of environmental justice have been effectively implemented, by using Indonesian environmental laws as reference whenever required. Furthermore, it aims to identify gaps in applying environmental justice laws and practices and provide recommendations for future improvements.

2. Materials and methods

The research method used in this study is literature. The literature research method is one of the key strategies in research data collection that relies on literature sources such as books, journal articles, magazines, and online documents related to the research topic (Sugiyono, 2010; Zed, 2004). This process allows researchers to reach a broader understanding of their field of study by reviewing existing work. An important step in this methodology is the search for relevant keywords in catalogs, indexes, and search engines to ensure broad coverage of literature relevant to the research topic (Benuf and Azhar, 2020; Rahardjo, 2011). Data are collected by using the keywords industrial relation combined with legal or environmental responsibility. Data collected are publicly available manuscripts from journals from 2020 to 2024. This method is very useful in determining the context and background of the research problem, explaining relevant theories, and identifying gaps in the existing literature that current research can address (Bungin, 2001).

Not only that, literature study research also involves activities such as reading, recording, and systematically organizing research materials. These activities ensure that researchers can identify trends, patterns, and consensus in the literature, as well as disagreements or unanswered questions that can serve as focal points for their research (Adi, 2021; Moleong, 2007). The literature research method leads to a deeper understanding of the subject and helps develop a conceptual framework or research hypothesis.

The analyses were conducted using content analysis. The first analysis was conducted to reduce the number of manuscripts, resulting in fewer manuscripts that focused on the subject matter. The sorted materials were then reviewed, discussed, and analyzed further to achieve the research purpose. For the purpose of the research, the researcher used Indonesian laws and regulations as the object of analysis whenever it was required. Therefore, any terms used therein must be referred to applicable laws in Indonesia.

3. Results and discussion

3.1. Environment law and regulations

Environmental Laws in various countries are designed to protect human health, preserve biodiversity, and ensure sustainable management of natural resources (Couzens, 2013). In Indonesia, for example, Law No. 32/2009 on Environmental Protection and Management emphasizes the importance of balancing economic development and environmental preservation. This law covers important aspects such as pollution control, law enforcement against environmental violations, and natural resource and waste management. It also encourages the application of good

environmental management principles by industries and communities, including efforts to prevent environmental damage and rehabilitate degraded environments (Hidup, 2009).

In addition to the law, various regulations and policies support implementing environmental law more specifically. These regulations can be in the form of government regulations, ministerial decrees, or regional regulations that address specific issues, such as hazardous waste management, air quality monitoring, and protection of swamp ecosystems (Yang and Percival, 2009). These policies and regulations ensure that all parties, private and public, comply with established environmental standards and take responsibility for preserving the environment. Effective implementation of these regulations requires inter-agency coordination, strict law enforcement, and active community participation in the monitoring and reporting process (Couzens, 2013).

Furthermore, to improve the effectiveness of environmental laws, many countries have also integrated a more inclusive and participatory approach to law enforcement. For example, community empowerment through environmental education and involvement in environmental decision-making processes (Manchikanti, 2017). This educates the public on the importance of environmental conservation and enables them to become active watchdogs in identifying and reporting potentially harmful activities (Manchikanti, 2020). On the other hand, specialized environmental courts are often established to handle cases related to environmental law violations, providing a faster and more effective mechanism for conflict resolution and sanctioning (Morgera, 2024).

Technology has also become an important tool in environmental monitoring and enforcement. The use of satellites, drones, and geographic information systems (GIS) has enhanced the ability of governments and other agencies to monitor compliance with environmental regulations in real time and with high accuracy. This helps in the rapid detection of violations and efficient intervention without waiting for reports from the public or environmental inspectors (Morgera and Tsioumani, 2012). In addition, the use of big data and artificial intelligence can help analyze environmental trends and predict the impact of certain activities on the environment, which can be the basis for better policy-making and regulation (Oldfield, 2013).

In a global context, international cooperation is crucial in addressing transnational environmental issues such as climate change, marine pollution, and illegal wildlife trade. International conventions and agreements such as the Paris Agreement and the CITES Convention are examples of cooperation between countries in setting standards that must be adhered to and encouraging collective efforts in handling environmental problems (Aylesworth et al., 2020). Countries that are party to these agreements must implement domestic regulations to fulfill international obligations, creating synergies between national and international environmental laws (Bashyal et al., 2023).

This means that environmental law is not limited to being a restrictive or punitive instrument. By complementing legislation with a comprehensive, participatory, technology-based approach and strengthening international cooperation, environmental law is not just limited to being a restrictive or punitive instrument. Rather, environmental law serves as a foundation that supports global environmental conservation and restoration efforts, minimizes negative impacts on ecosystems, and

ensures the sustainability of life for generations to come.

3.2. Environmental justice

Environmental justice is a concept or principle that ensures that all people, regardless of race, nationality, or income level, have equal rights to protection from negative environmental impacts and fair access to clean and safe environmental resources (Kronenberg et al., 2020). This includes equal distribution of environmental burdens, such as pollution and hazardous waste, and equal access to places of high environmental quality, such as parks and areas with clean air (Menton et al., 2020). Environmental justice recognizes that poor and minority communities often suffer more from poor environmental conditions and seeks to address such discrimination through inclusive and equitable policies and practices (Álvarez et al., 2020).

The importance of environmental justice lies not only in its aspects of equity and social justice but also in its contribution to overall environmental sustainability. Ensuring all sections of society have equal rights and opportunities to participate in environmental decision-making can create more comprehensive and effective policies that recognize and value a diversity of perspectives and needs (Liotta et al., 2020). It also increases community awareness and involvement in environmental issues, which is crucial for long-term environmental efforts. Thus, environmental justice is essential in fighting for a healthier environment and a more sustainable future for all individuals, not limited to certain groups (Johnston and Cushing, 2020).

Moreover, environmental justice plays a vital role in addressing the impacts of climate change that often hit the most vulnerable communities harder. The resulting policies are more equitable and effective by ensuring that climate change adaptation and mitigation strategies include perspectives from diverse communities, especially those most affected (Sze, 2020). As climate change is a global challenge that recognizes no geographic or socio-economic boundaries, an approach involving all societal levels is crucial. Environmental justice emphasizes the importance of inclusive solutions that accommodate diverse needs and conditions, minimizing inequalities that climate impacts may exacerbate (Martin et al., 2020).

3.3. Implementation of environmental law in industrial pollution cases

In the case of pollution caused by industrial activities, implementing environmental law is an important step to minimize negative impacts on the environment and public health. The government and environmental regulatory agencies play an active role in enforcing regulations and standards that have been set to control industrial emissions and waste (Khasanova and Saydulgerieva, 2024). This includes conducting regular inspections and environmental monitoring to ensure all industrial facilities comply with applicable regulations. When an industry is found to violate environmental standards, such as releasing toxic waste into the water or air beyond the allowable limits, the authorities can take strict actions ranging from administrative sanctions and fines to temporary or permanent closure of the facility. This law enforcement aims not only to remedy the impacts that have occurred but also as a deterrent effect to prevent the recurrence of similar violations in the future (Sitorus et al., 2023).

In addition, the implementation of environmental law also provides significant space for public participation in addressing industrial pollution issues. Public complaint mechanisms and participatory processes in environmental decision-making allow communities directly affected by pollution to voice their concerns (Paloniitty et al., 2024). Governments often apply the principle of transparency in these processes, ensuring that data and information on industrial environmental impacts are made available to the public. Through the environmental justice process, individuals or community groups can also demand compensation or remediation measures from companies responsible for pollution. Effective implementation of environmental law in this context protects the environment, increases industry accountability, and strengthens people's right to a healthy environment (Li et al., 2024).

Implementing environmental law in industrial pollution cases does not stop at case-by-case handling. In the long term, this implementation also focuses on capacity building and creating better frameworks to prevent pollution. This may include the development of stricter industry standards, training and education for workers and industry management on environmentally friendly practices, and investment in cleaner and more efficient technologies (Kumar et al., 2024). These measures are developed to repair the damage already done and steer the industry toward more sustainable operations aligned with environmental preservation. Thus, implementing environmental laws is expected to be a catalyst for the transformation of the industrial sector towards a model that prioritizes economic profit and is responsible for the environment and communities (Shang et al., 2024).

Effective and efficient execution of environmental laws also depends on the ability of the judicial system to adapt to evolving environmental challenges. This includes the training of specialist environmental judges and lawyers and the development of a solid jurisprudence that can provide legal precedents (Wang et al., 2024). In many regions, the need for greater awareness and public support of environmental issues has led to the formation of civil society organizations and advocacy groups focused on strengthening oversight of industry compliance with environmental regulations. Through synergies between government agencies, the industrial sector, civil society, and the academic community, implementing environmental law can become more effective, strengthening global efforts to address and prevent industrial pollution (Bodansky and van Asselt, 2024). Thus, environmental law acts as an enforcement tool and an empowering instrument that enables sustainable and equitable development for all concerned.

3.4. Principles of environmental justice applied in response to pollution

The principle of environmental justice applied in pollution response reflects the need to ensure that the environmental burdens and benefits of economic activities are fairly distributed across society. In the context of addressing industrial pollution, this principle guides authorities to take measures that not only mitigate pollution but also consider the socioeconomic impacts on affected communities (Brinkley and Wagner, 2024). This means that remediation and compensation measures should be directed primarily towards communities that are most vulnerable and may have historically experienced disproportionate exposure to environmental risks. Environmental justice

also demands transparency in decision-making processes and active participation of affected communities in designing and implementing Solutions (Browne et al., 2022). Thus, this principle emphasizes addressing the physical impacts of pollution and restoring justice to those most affected.

In addition, the environmental justice principle also suggests the recognition of human rights and the right to a healthy environment as fundamental aspects of responding to pollution. This implies an obligation for industry and government to prevent pollution that could harm human health and the environment. In implementing environmental justice, it is crucial to identify and address structural inequalities that may be responsible for the unfair distribution of environmental risks (Ramirez-Andreotta, 2019). This can include efforts to improve economic equality, access to resources, and opportunities for all in the face of environmental challenges. Thus, pollution response based on environmental justice principles seeks to repair the damage and build a more equitable and sustainable system where everyone has an equal opportunity to live in a healthy and safe environment (Horgan et al., 2024).

Implementing environmental justice in pollution response requires a comprehensive and multidisciplinary approach that integrates environmental, economic, and social aspects. This approach seeks to address the root causes of pollution as well as correct underlying systemic injustices (Wang and Xing, 2024). Governments, the private sector, and civil society should work together to develop policies and practices that prioritize environmental protection and social well-being. This means that environmental policies should be supported by strong laws, effective legal enforcement, and a justice system that is accessible to all levels of society (Martínez-Alier, 2023).

Furthermore, education and awareness about environmental and justice issues should be increased throughout society to strengthen public support for equitable environmental policies and practices. Education can help build a more environmentally conscious generation committed to sustainable development and social justice (Templer, 2024). In addition, technology and innovation can be harnessed to develop environmentally friendly solutions that support environmental justice principles. Investments in clean energy, efficient waste treatment technologies, and sustainable production practices can lower the industry's environmental impact while creating new jobs and economic opportunities in the green economy (Sasser, 2024).

Finally, community participation in the decision-making process is essential to ensure that their voices are heard and that the solutions found truly reflect their needs and desires. Collaboration platforms between the government, private sector, civil society groups, and citizens can facilitate constructive dialog and help reach consensus in addressing pollution and environmental justice issues (Scott-Buechler et al., 2024). Through a holistic approach based on environmental justice principles, responses to pollution can be developed that are not only effective in reducing pollution but also support the creation of a more equitable, inclusive, and sustainable society. Implementing environmental justice is an ongoing process, requiring engagement and commitment from all parties to collectively work towards a common goal for the environment and humanity.

4. Conclusion

Legal responsibility and environmental justice in the context of case studies on industrial pollution emphasize the importance of strict laws and fair policies to address pollution. Industries responsible for pollution should comply with existing regulations and, in the event of violations, should be subject to sanctions that reflect the level of damage they have caused. In addition, sufficient efforts should be made to ensure that directly affected communities are involved in the decision-making process and receive adequate compensation.

Furthermore, the government should strengthen supervision and law enforcement to prevent repeated pollution cases and protect citizens' rights. This requires cross-sector cooperation between government, industry and local communities to create sustainable solutions integrating environmental justice and local socio-economic development. Thus, public awareness and access to information must also be improved as part of broader efforts to advance environmental justice and legal responsibility.

The precautionary principle should be prioritized in creating a more just and sustainable environment. This principle states that if activities have the potential to cause significant environmental damage, precautionary measures should be taken even if there is no complete scientific consensus. This includes, among other things, changes in production processes to reduce waste, improvements in cleaning technologies, and the development of more effective waste management strategies.

In addition, the international community needs to work together to establish policies and standards that promote environmental responsibility and equity across national boundaries. Global efforts to reduce industrial pollution not only protect the environment but also help ensure that no country or community suffers unfairly from industrial activities elsewhere. In conclusion, upholding legal responsibility and achieving environmental justice in the face of industrial pollution requires a comprehensive approach that combines effective law enforcement, active public participation, technological innovation, and international cooperation.

In short, it can be said that to achieve environmental justice and legal responsibility in view of industrial pollution, below are things that need to be done and executed:

- Creation and mixing of capable and innovative policies;
- Enhance the capacity and capability of the community to their involvement, support, and participation;
- Participate in international commitment through cross-border cooperation.

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