

# THE *QUAD HELIX* COLLABORATION IN ENVIRONMENTAL LAW REFORM IN BANDAR LAMPUNG CITY: A POLICY RECOMMENDATION

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## ABSTRACT

The research objective is to identify policy recommendations based on the Quad Helix approach for reforming environmental law in Bandar Lampung City, emphasizing the collaborative roles of government, academia, NGOs, and local communities. As urbanization accelerates, environmental challenges have become increasingly complex, requiring a comprehensive and participatory legal framework to ensure sustainable urban governance. This study analyzes the effectiveness of existing environmental laws, identifies enforcement gaps, and proposes concrete recommendations for improvement. Employing a qualitative research approach, this study utilizes in-depth interviews and document analysis to gather insights from key stakeholders. The findings highlight several critical areas for reform, leading to the following recommendations: (1) Strengthening law enforcement through enhanced institutional capacity and stricter, more consistent sanctions against environmental violations; (2) Increasing public education and awareness by implementing educational programs and community engagement initiatives; (3) Investing in environmental infrastructure, including waste management and drainage systems; and (4) Enhancing multi-stakeholder collaboration, particularly with the private sector, NGOs, and local communities, to improve environmental sustainability programs. By integrating these recommendations within a Quad Helix governance model, this research underscores the necessity of synergistic and inclusive environmental law reform in Bandar Lampung, ensuring a resilient, participatory, and ecologically sustainable urban future.

## INTRODUCTION

The rapid development of Bandar Lampung City in the last few decades has had a significant impact on the quality of the environment. Population growth, increased industrial activity, and expansion of urban areas have caused various environmental problems, such as water and air pollution,

inadequate waste management, and land and forest degradation. In this context, environmental legal policy becomes an important instrument in regulating, protecting and preserving the environment (Sinatra et al., 2022).

The city of Bandar Lampung has implemented several regional regulations

(Perda) and policies aimed at managing the environmental impacts of city development. However, the effectiveness of these policies remains an important question that needs to be studied in more depth. This article aims to explore the environmental legal policies that apply in Bandar Lampung City, evaluate their implementation, and identify the challenges and obstacles faced (Sitadevi, 2017).

The city of Bandar Lampung already has a spatial planning process, space utilization, and space utilization control. Environmental problems in Bandar Lampung City, as the capital of Lampung Province, face various environmental challenges related to rapid urbanization, increasing population, and changes in land use. In facing these various challenges, the local government implements various environmental legal policies aimed at maintaining environmental quality and ensuring sustainable development (Nugraha, 2023).

The problems that occur in green open spaces in Bandar Lampung City stem from conflicts over land use, which continue to reduce the area of green open spaces every year, especially the proportion of public green open spaces. Based on Bandar Lampung City Regional Regulation Number 4 of 2021 Article 53 paragraph (2d) concerning Regional Spatial Planning for 2021-2041, the provision of public green open space must reach at least 20% of the total urban area. However, land that was previously green open space has now been converted into business buildings, offices, tourist attractions, and even mining areas, which ultimately causes ecological disasters such as flooding. This situation makes the city of Bandar Lampung known as a city with minimal green open space. This argument is strengthened by data on the percentage of public green open space in Bandar Lampung City (Nugroho et al., 2023).

The decline in the area of public green open space in Bandar Lampung City is a serious concern, especially because Bandar Lampung City Regional Regulation Number 4 of 2021 concerning RTRW regulates that the proportion of public green open space should reach a minimum of 20% of the total area. This

situation raises problems regarding the availability of public green open space which has a broad impact on the people of Bandar Lampung City (Sippa Cipta Karya, 2020).

With environmental issues that have implemented various policies, the City of Bandar Lampung continues to face several major challenges in environmental management, including: (1) Water and River Pollution: Pollution of rivers and water bodies in Bandar Lampung is a serious problem due to household, industrial and agricultural waste that is not managed properly. The Way Kuala, Way Balau and Way Kuripan rivers, for example, have experienced a significant decline in water quality. (2) Suboptimal Waste Management: Even though there are regulations regarding waste management, implementation in the field is often less effective. Bakung Final Disposal Site (TPA) as the main landfill in Bandar Lampung is facing the problem of overcapacity and lack of recycling facilities. (3) Air Pollution: The growth in the number of motorized vehicles and industrial activities has contributed to the increase in air pollution in Bandar Lampung. This has an impact on increasingly poor air quality, especially in densely populated areas and industrial areas. (4) Land Conversion and Deforestation: Rapid urbanization in Bandar Lampung has caused land conversion, including deforestation and conversion of agricultural land into residential and industrial areas. This has an impact on the loss of natural habitat, decreased biodiversity, and increased risk of disasters such as floods and landslides (Mahroji & Indrawati, 2020).

Environmental management and protection is a systematic and integrated effort carried out to preserve environmental functions and prevent environmental pollution and/or damage, which includes planning, utilization, control, maintenance, supervision and law enforcement. (Chesya: 2022) The problems in this research are as follows: "How are the policy recommendations based on the Quad Helix approach for reforming environmental law in Bandar Lampung City?"

The references for previous research

include: (1) *Sasana Law Journal* – “*Legal Review of the Application of the Quadruple Helix Concept in Empowering MSME Entrepreneurs Incorporated in Cooperatives*” (M. Hendra Razak). This journal discusses the role of the *Quadruple Helix* in Indonesia's national economic development, with a focus on empowering MSMEs through cooperatives. The article highlights the importance of collaboration between government, businesses, academia, and society in improving economic welfare. It emphasizes that legislation must support the involvement of these four actors in building a sustainable economic ecosystem. This journal is relevant because it explores the application of the *Quadruple Helix* in the economic sector, particularly in community empowerment through MSMEs. In the context of research on environmental law reform in Bandar Lampung, this concept can be used to understand how Quad Helix collaboration can be applied in environmental policy, with each actor playing a role in the regulation and implementation of environmental law (Mohd Hendra Razak, 2022). (2) *Indonesian Legislation Journal* – “*Legal Study of the Application of the Quadruple Helix Concept in CSR Implementation for MSMEs*” (Teguh Tresna Puja Asmara & Tarsisius Murwadji). This article highlights how the *Quadruple Helix* concept can be utilized in the implementation of Corporate Social Responsibility (CSR) to support MSMEs. It notes that CSR implementation remains fragmented and suboptimal. By using the *Quadruple Helix* model, collaboration between government, academia, businesses, and society can strengthen CSR effectiveness and enhance social welfare. This study is relevant to environmental law reform in Bandar Lampung because it highlights the role of CSR in environmental sustainability. In this research context, CSR can serve as a legal and policy instrument in environmental law reform, where the Quad Helix ensures that corporate social responsibility (especially in the industrial sector) is directed toward environmental sustainability and regulatory compliance (Asmara & Murwadji, 2020). (3)

*Journal of Administrative Reform* – “*Policy Analysis in Efforts to Enforce Environmental Law in Indonesia*” (Baginda Parsaulian). This article discusses challenges in enforcing environmental law in Indonesia, focusing on cases of forest and land fires (karhutla), which remain a serious issue. The journal identifies key obstacles in environmental law enforcement, weak regulatory enforcement, and lack of stakeholder collaboration. Additionally, it discusses the role of regulations such as Law No. 32 of 2009 on Environmental Management. This journal is directly relevant to research on environmental law reform in Bandar Lampung. The article highlights weaknesses in the environmental legal system, which can be addressed through the Quad Helix approach, where collaboration between government, academia, businesses, and society can strengthen environmental law enforcement. The implementation of Quad Helix can assist in formulating stronger policies and more effective monitoring systems (Parsaulian, 2020).

## THEORETICAL BASIS

The reform of environmental law in Bandar Lampung City through the Quad Helix framework is grounded in several key theoretical perspectives that emphasize collaborative governance, environmental law, and sustainable development. This section outlines the theoretical foundations that support the study, including the Quad Helix Model, Environmental Governance Theory, Legal Policy Theory, and Sustainable Development Theory. The Quad Helix Model (Carayannis & Campbell, 2009) is a framework that extends the Triple Helix Model by integrating four key actors: government, academia, industry, and civil society. This model posits that innovation and policy effectiveness emerge from multi-stakeholder collaboration, where each actor plays a distinct yet interdependent role: (1) Government establishes the legal framework, enforces regulations, and ensures compliance with environmental policies. (2) Academia provides research, scientific analysis, and

expert recommendations to improve environmental policies and enforcement mechanisms. (3) Industry (business sector) is responsible for adhering to environmental regulations, implementing Corporate Social Responsibility (CSR) initiatives, and developing eco-friendly business practices. (4) Civil society (NGOs and communities) acts as a watchdog, advocating for environmental sustainability, monitoring policy implementation, and participating in community-based environmental programs. The Quad Helix approach is particularly relevant in environmental law reform, as it fosters a collaborative governance system that enhances law enforcement, public participation, and policy innovation. (Nguyen & Marques, 2022) (Wahdiniwati et al., 2022)

Environmental Governance Theory refers to the processes, institutions, and mechanisms through which environmental policies are formulated, implemented, and enforced (Lemos & Agrawal, 2006). This theory emphasizes that effective environmental law enforcement requires multi-stakeholder collaboration, transparency, and accountability. Key principles include: (1) Decentralization, where local governments play a crucial role in implementing environmental regulations. (2) Participatory decision-making, ensuring that civil society, businesses, and academia contribute to policy development. (3) Adaptive management, allowing environmental policies to evolve based on scientific evidence and socio-economic changes. This theory supports the Quad Helix approach by demonstrating the importance of governance structures that integrate law, science, economic interests, and community participation in addressing environmental challenges. (Mahida, 2020) (Signori et al., 2021) (Ghosh, 2023)

Legal policy theory (Friedman, 1975) explores how laws function within society and how they can be reformed to address socio-political challenges. This theory is relevant in analyzing the effectiveness of existing environmental laws in Bandar Lampung and identifying areas for improvement. Key aspects include: (1) Regulatory effectiveness:

Examining whether environmental laws in Bandar Lampung City are adequately enforced. (2) Legal gaps and enforcement challenges: Identifying inconsistencies, loopholes, and limitations in environmental regulations. (3) Policy recommendations: Proposing legal reforms that align with sustainable development goals and integrate Quad Helix collaboration. (Garmestani et al., 2019) (Kreitzer et al., 2022)

On the other hand, The Sustainable Development Theory (Brundtland Report, 1987) provides a foundation for environmental law reform by emphasizing the balance between economic growth, environmental protection, and social well-being. According to this theory, environmental laws must be designed to ensure long-term ecological sustainability while supporting urban and industrial development. Principles of sustainable development that apply to this study include: (1) Precautionary principle, where environmental risks are mitigated before irreversible damage occurs. (2) Polluter pays principle, holding industries accountable for environmental degradation. (3) Intergenerational equity, ensuring that natural resources and ecosystems are preserved for future generations. (Muharara & Satria, 2018) (Irungu et al., 2023) (Stoica et al., 2022)

The theoretical foundations of this study highlight the importance of multi-stakeholder governance, legal reform, and sustainability in addressing environmental challenges. The Quad Helix Model provides a strategic framework for strengthening environmental law enforcement, while Environmental Governance Theory and Legal Policy Theory offer insights into regulatory effectiveness. Furthermore, Sustainable Development Theory reinforces the need for environmentally sound policies that balance urban growth and ecological preservation. These theoretical perspectives collectively support the research objective of developing policy recommendations for environmental law reform in Bandar Lampung City.

## RESEARCH METHODOLOGY

The data collection method used in this research follows a qualitative approach with a focus on library research and empirical data collection (Yusanto, 2020). The study integrates secondary data from various sources, including laws and regulations, previous research journals, policy documents, and academic literature related to environmental law and the Quad Helix model. Additionally, primary data is gathered through in-depth interviews with key stakeholders representing the four actors of the Quad Helix framework: (1) Government – Environmental agencies, municipal authorities, and policymakers responsible for legal and policy enforcement. (2) Academia – Legal scholars, environmental law experts, and researchers specializing in environmental governance. (3) Business Sector – Corporate representatives involved in Corporate Social Responsibility (CSR) programs and sustainable business practices. (4) Civil Society (NGOs and Local Communities) – Environmental activists, community leaders, and organizations advocating for sustainable development and policy reform.

The in-depth interviews are conducted in a semi-structured manner, allowing respondents to provide detailed insights while ensuring that discussions align with the research objectives. Document analysis is also employed to examine existing legal frameworks, environmental policies, and enforcement mechanisms in Bandar Lampung City, ensuring a comprehensive understanding of the challenges and potential reforms in environmental law (Creswell, 2018).

This study adopts a thematic analysis approach to systematically analyze qualitative data related to environmental law enforcement and Quad Helix collaboration. The data analysis follows these three key stages (Miles & Huberman, 1994): (1) Data Reduction – Collected data from interviews, legal documents, and literature is organized, categorized, and filtered to focus on relevant themes related to stakeholder collaboration, policy gaps, and reform strategies. Unnecessary or redundant information is

excluded to maintain clarity and precision in the analysis. (2) Data Presentation – The processed data is structured into thematic categories, allowing for a systematic examination of key findings. This includes stakeholder perspectives on environmental law reform, challenges in enforcement, and proposed solutions within the Quad Helix framework. Data is presented in narrative form, tables, and conceptual models to facilitate a clearer understanding of the research findings. (3) Conclusion Drawing and Verification – Based on the analysis, conclusions are formulated regarding the effectiveness of the Quad Helix model in environmental law reform. The findings are further validated through triangulation, comparing insights from different data sources (interviews, legal documents, and literature) to ensure consistency and reliability. The study also applies member checking, where key respondents review the interpretations to confirm the accuracy of their perspectives. By applying this integrated data collection and analysis approach, this research ensures a comprehensive evaluation of environmental law reform in Bandar Lampung City, while offering policy recommendations based on the Quad Helix model to enhance legal enforcement and sustainability. (Fadli, 2021) (Chowdhury, Anup & Shil, 2021)

## RESULTS AND DISCUSSION

Lampung Province is located at the tip of Sumatra Island, which consists of 16 districts and cities, one of which is Bandar Lampung City. Bandar Lampung City is the capital of Lampung Province, which is the area with the highest density in Lampung Province. The development process in this city is in full swing. Most of the development in Bandar Lampung City is in the form of physical development such as urban facilities, housing, buildings, facilities, and transportation infrastructure. Physical area development is one of the uses of land/land, where the increase in the number of residents or residents in an area, whether from residents of the area itself or due to incoming migration,



will result in increased physical area development, which means decreasing empty land, physical area development.

The most rapid development usually takes place in urban areas. Apart from that, the need for green open space is closely related to the natural surroundings, so before knowing what green open space is, we must know what is meant by natural surroundings. Green open space is an elongated area in the form of a path and/or clustered area, the use of which is open and a space that can be accessed by the public for a limited or unlimited period. The arrangement of green open spaces in Indonesia is regulated in Law Number 26 of 2007 concerning Spatial Planning which requires the provision of Green Open Space (RTH) of at least 30% of the area of an area, of which 20% is public space and 10% is private space.

The Bandar Lampung City Government has established various regulations to protect the environment, including: (1) Regional Regulation (Perda) on Environmental Management: This Regional Regulation regulates various aspects of environmental management, such as pollution control, waste management, protection of natural resources, and sustainable development planning. These instruments are expected to provide a strong legal basis for managing the environmental impacts of urban development. (2) Regulations on Regional Spatial Planning (RTRW) for Bandar Lampung City: RTRW regulates land use in this city, including zoning for protected areas, residential areas, industrial areas, etc. This regulation is important to ensure that development in the city is carried out by considering sustainable environmental aspects (Sundari: 2005). (3) Waste and Waste Management Policy: This policy covers regulations regarding the management of household and industrial waste, including procedures for collection, transportation, processing and final disposal. Bandar Lampung City has Bakung TPA as the main facility for waste disposal, although its existence still faces capacity and processing efficiency problems. (Chafid: 2011)

Recognizing a healthy environment as a universal human right has not only technical implications, but also rational-philosophical implications. This reflects that environmental protection to create decent living conditions has become a universal moral code that transcends national and cultural boundaries (Harun, 1995). However, Indonesia still faces major challenges, ranging from inadequate policy structures to a lack of political will. This article will describe these various problems to show where Indonesia's weaknesses lie as a country that has signed the UN Resolution on Access to a Clean, Healthy and Sustainable Environment as a Universal Human Right (Takdir, 2003).

However, the provision of Green Open Space in Bandar Lampung City has not yet reached the target of 30% of the total area or at least 20% for public spaces managed by the city government. Based on data from the Bandar Lampung City Bappeda, in 2009, the area of public open space was recorded at around 2,489.80 hectares or 12.62% of the total area of the city. Entering 2012, the area of public green open space decreased to around 2,185.59 hectares, with the area of private green open space amounting to 289.7 hectares. This shows a change in the use of public green open space of around 304.21 hectares.

The percentage of Green Open Space (RTH) in Bandar Lampung until 2012 only reached 11.08%. When compared with the area of public green open space in 2009, there was a decrease of 1.54% of the total area. This achievement does not meet the minimum requirements for green open space in urban areas, which should reach 20% for public spaces. This condition is likely caused by changes in land use due to the rapid development in Bandar Lampung City.

### **1. Several policies related to environmental law in Bandar Lampung City**

Several policies related to environmental law in Bandar Lampung City face various challenges, including: (1) Weak Law Enforcement: Even though there are quite

clear regulations, law enforcement in the environmental sector is still often weak. Many violations of environmental regulations are not followed up with strict legal action. This is caused by limited resources, supervisory capacity, and inconsistencies in law enforcement. (2) Low Community Participation: The level of community awareness and participation in preserving and protecting the environment is still relatively low. Many people do not understand the importance of good waste management, reducing plastic use, or participating in green activities. This requires greater efforts from the government to increase education and environmental awareness campaigns. (3) Limited Environmental Management Infrastructure: Infrastructure that supports environmental management such as adequate rubbish dumps, recycling facilities and liquid waste management is still limited. Bakung landfill, as the only final disposal site in this city, often experiences overcapacity and is not equipped with adequate processing technology. (4) Challenges of Climate Change and Natural Disasters: Global climate change has an impact on increasing the frequency of natural disasters such as floods and landslides in Bandar Lampung City. This climate uncertainty adds to the complexity of environmental management, especially in mitigation and adaptation efforts to the impacts of climate change.

Normatively, the Environmental Protection and Management Law is more comprehensive in regulating the principles of environmental protection and management compared to previous regulations, because the Environmental Protection and Management Law is a refinement of previous environmental regulations, and also includes various principles/principles related to the environment that are developing at the international level. However, at the implementation level, there are still many obstacles, especially in terms of law enforcement. This is because there is so much legislation in Indonesia, both at the same level, namely law. and at a level lower than law, which intersects and/or overlaps, either

directly or indirectly, with regulations in environmental law itself.

## **2. The Effectiveness of Environmental Legal Policies in Bandar Lampung City**

To increase the effectiveness of environmental legal policies in Bandar Lampung City, several strategic steps can be proposed: (1) Strengthening Law Enforcement. The government needs to increase the capacity of environmental monitoring institutions and optimize law enforcement against environmental violations. This includes the application of stricter and consistent sanctions against perpetrators of environmental pollution and destruction. (2) Increasing Public Education and Awareness: Educational programs and environmental awareness campaigns need to be increased to encourage active community participation in protecting the environment. This campaign can involve schools, community organizations, and the private sector to create a culture of environmental care. (3) Investment in Environmental Infrastructure: The Bandar Lampung City Government must increase investment in developing infrastructure that supports environmental management, such as waste recycling facilities, waste processing, and a good city drainage system. (4) Collaboration with Third Parties: Collaboration with the private sector, NGOs and local communities can increase the effectiveness of environmental programs. This partnership can include waste management, city greening programs, and renewable energy development. (Fahmi: 2011)

In the context of Bandar Lampung City's green open spaces, environmental law reform policies must pay attention to these aspects to improve environmental quality and community welfare (Koesnadi: 2005). Legislation relating to environmental management, including natural resource sector regulations that affect ecosystems, is still dominated by the authority of the central government and a small part is at the provincial level. Examples of these regulations include Law Number 23 of 1997 concerning

Environmental Management, Government Regulation Number 20 of 1990 concerning Control of Water Pollution which was updated with Government Regulation Number 82 of 2001, Government Regulation Number 18 of 1999 concerning B3 Waste Management, Regulation Government Regulation Number 27 of 1999 concerning Environmental Impact Analysis (AMDAL), Government Regulation Number 41 of 1999 concerning Control of Air Pollution, Government Regulation Number 19 of 1999 concerning Control of Marine Pollution and/or Destruction, and Government Regulation Number 6 of 1999 concerning Forest Concession and Collection of Production Forest Products. As a result, legal authority in environmental management, especially to control environmental impacts, is very limited. Apart from that, there is also Bandar Lampung City Regional Regulation Number 4 of 2021 Article 53 paragraph (2d) concerning Regional Spatial Planning for 2021-2041.

The environmental law reform must be related to the application of the principles of good governance and the concept of open government that recognizes public rights. This includes the public's right to observe and monitor the behavior of public officials in the decision-making process, the right to access information, the right to participate in the formation of public policy, as well as the right to raise objections if their participation rights are ignored. Regional governments need to immediately realize this concept. By creating a transparent government, the public will be encouraged to supervise policy makers, while the implementers of power will be more controlled and avoid deviations that are detrimental to the public interest.

Based on the description above, it can be analyzed that the role of local government in addressing environmental issues does not support existing policies and the concept of legal reform, especially for people who are still affected by the lack of green open space in the city of Bandar Lampung, the impact of which is that the air conditions in the city are decreasing, in addition to the catchment area. and water absorption is also decreasing so

efforts are needed to optimize it to support existing Regional Regulations.

### **3. Critical Gaps**

The study identifies several critical gaps in the enforcement of environmental laws in Bandar Lampung City. One major issue is inconsistent legal implementation, where regional environmental regulations (Perda) are often poorly enforced. Weak sanctions against industrial polluters and land-use violators further undermine the effectiveness of existing policies. Additionally, limited institutional capacity poses a significant challenge, as environmental agencies lack sufficient resources, personnel, and technical capabilities to effectively monitor compliance and enforce regulations. Another pressing concern is legal ambiguities and overlapping regulations, where conflicts between regional and national environmental laws create enforcement challenges, particularly in areas related to land use and waste management policies. These findings highlight the urgent need for legal harmonization, stronger institutional frameworks, and improved monitoring mechanisms to ensure effective environmental law enforcement in Bandar Lampung City.

### **4. Stakeholder Roles in Environmental Law Reform through Quad Helix Collaboration**

The reform of environmental law in Bandar Lampung City requires strong collaboration among government, academia, businesses, and civil society, as outlined in the Quad Helix model. Each stakeholder plays a crucial role in ensuring that environmental policies are effectively formulated, implemented, and monitored.

The government serves as the primary regulatory authority responsible for policy formulation and enforcement. However, the study finds that existing environmental policies lack strict implementation mechanisms, resulting in weak enforcement and regulatory inconsistencies. Furthermore, limited public engagement in environmental decision-making weakens policy legitimacy,



while coordination between local and national government institutions remains fragmented. To address these challenges, the study recommends strengthening law enforcement capacity by integrating community-based environmental monitoring systems and increasing public participation in policymaking to enhance transparency and accountability.

The academia plays a key role in policy innovation by providing scientific evidence and legal expertise. However, the study finds that academic research is underutilized in policymaking, and collaboration between universities and government agencies is limited. Additionally, legal education programs for policymakers and law enforcement agencies are insufficient, leading to gaps in regulatory knowledge and enforcement capacity. To bridge this gap, the study suggests establishing a research-policy interface where academic institutions actively contribute to environmental governance through evidence-based policymaking, legal training programs, and sustainability assessments.

The business sector is expected to comply with environmental regulations and adopt sustainable corporate practices. However, findings indicate that many businesses prioritize economic interests over environmental compliance, while Corporate Social Responsibility (CSR) programs are often fragmented and lack long-term sustainability impact. Moreover, regulatory incentives for businesses adopting green practices are insufficient, making environmental compliance less attractive. To improve corporate adherence to environmental laws, the study recommends strengthening CSR regulations to mandate industry contributions to environmental conservation, providing tax incentives and subsidies for companies adopting sustainable production methods, and enhancing collaboration between businesses and local governments in waste management and pollution control initiatives.

The civil society sector, including NGOs, environmental activists, and local

communities, plays a vital role in advocacy and community engagement. However, challenges remain, such as limited legal mechanisms for citizen participation in environmental governance, lack of environmental awareness and education programs, and weak enforcement of public complaints against environmental violations. To empower civil society, the study recommends strengthening legal mechanisms for public participation in environmental policymaking, increasing environmental literacy programs in schools and communities, and enhancing digital platforms for citizen reporting of environmental violations. By improving civil society engagement, environmental governance can become more transparent, inclusive, and participatory.

## **5. Policy Recommendations for Strengthening Environmental Law through the Quad Helix Model**

Based on the study's findings, several policy recommendations are proposed to enhance environmental law enforcement and governance in Bandar Lampung City through the Quad Helix model. First, strengthening law enforcement mechanisms is essential to ensure compliance with environmental regulations. This includes establishing independent environmental oversight bodies with enforcement authority, implementing harsher penalties for industries violating environmental regulations, and enhancing inter-agency coordination between local, regional, and national authorities. Second, enhancing public awareness and community participation is crucial to fostering a culture of environmental responsibility. This can be achieved by integrating environmental education into school curricula and community outreach programs, developing digital platforms for citizen engagement, allowing real-time reporting of environmental violations, and promoting eco-friendly initiatives, such as community-led waste management programs. Third, encouraging business sector participation in environmental sustainability is necessary to align corporate practices with environmental

goals. This involves introducing financial incentives for businesses adopting eco-friendly practices, mandating CSR contributions toward environmental protection initiatives, and fostering public-private partnerships for sustainable infrastructure projects. By integrating businesses into the environmental governance framework, sustainability efforts can be more effective and far-reaching.

Lastly, integrating academia in policy development can bridge the gap between scientific research and environmental law enforcement. The study recommends establishing collaborative research hubs where universities work with policymakers to provide scientific input on environmental law reform. Additionally, training programs for government officials should be developed to enhance legal enforcement capacity, while applied research projects should be promoted to address real-world environmental challenges in Bandar Lampung. By implementing these recommendations, the Quad Helix model can serve as a foundation for effective environmental governance, ensuring that Bandar Lampung City achieves a more resilient, participatory, and ecologically sustainable legal framework (Prihanto, 2021).

## CONCLUSION

Based on the findings, the study concludes that Bandar Lampung City's environmental legal policy has significant potential for maintaining environmental quality and supporting sustainable development, though implementation challenges persist. Effective law enforcement, education, infrastructure development, and collaboration are vital for improving environmental quality and serving as a model for other cities. The need for a comprehensive regulatory reform is essential to enhance air quality and prevent natural disasters. The study emphasizes the importance of the Quad Helix Model in fostering collaborative governance, integrating government, academia, business,

and civil society. Key recommendations include strengthening enforcement mechanisms, enhancing public participation, incentivizing eco-friendly business practices, and incorporating academic expertise into policy development. By adopting these strategies, Bandar Lampung can build a resilient and sustainable legal framework for environmental governance.

## Recommendation

Here are three key recommendations for improving environmental legal policies in Bandar Lampung: (1) Strengthen Law Enforcement. Enhance law enforcement mechanisms by imposing stricter penalties for environmental violations and improving regulatory oversight to ensure compliance and deter future infractions. (2) Increase Public Awareness and Participation: Develop educational programs and community engagement initiatives to empower citizens with knowledge about environmental issues and encourage their active involvement in protecting the environment. (3) Incentivize Eco-Friendly Business Practices: Provide financial incentives for businesses that adopt sustainable practices and integrate Corporate Social Responsibility (CSR) into environmental protection policies, encouraging positive contributions to the environment.

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### **Laws and Regulations**

- Law No. 4 of 1982 on the Basic Provisions for Environmental Management.
- Law No. 23 of 1997 on Environmental Management.

- Law No. 32 of 2009 on Environmental Protection and Management.
- Government Regulation No. 20 of 1990 on Water Pollution Control.
- Government Regulation No. 82 of 2001 and Government Regulation No. 18 of 1999 on Hazardous and Toxic Waste (B3) Management.
- Government Regulation No. 27 of 1999 on Environmental Impact Assessment (AMDAL).
- Government Regulation No. 41 of 1999 on Air Pollution Control.
- Government Regulation No. 19 of 1999 on Marine Pollution and/or Destruction Control.
- Government Regulation No. 6 of 1999 on Forest Utilization and Harvesting of Production Forest Products.