

Harmonization of Mining Laws Post-Centralization in the Implementation of the Regional Action Plan for Mercury Reduction and Elimination (RAD-PPM) in West Kalimantan Province

Herbin Mardongan Sihombing*, Laksanto Utomo, Amalia Syauket

Universitas Bhayangkara Jakarta Raya, Indonesia

Email: herbinsihombing9@gmail.com*, laksanto@gmail.com,

Amalia.syauket@dsn.ubharajaya.ac.id

Keywords:

legal harmonization; mining centralization; rad-ppm; mercury; west kalimantan Forkopimda.

ABSTRACT

This research is motivated by the centralization of mining affairs from regional to central government under Law No. 3 of 2020 on Mineral and Coal Mining, creating a legal gap in West Kalimantan Province. The region remains burdened with obligations to implement the RAD-PPM under the Minamata Convention Ratification (Law No. 11 of 2017) to mitigate impacts of Artisanal and Small-scale Gold Mining (PESK/PETI), while licensing control and operational supervision have been entirely withdrawn to the Central Government. This study analyzes the juridical harmonization of this gap and formulates strengthened Forkopimda governance to address obstacles in ecological supervision of community mining. The method used is normative-empirical legal research with a qualitative approach, employing Statutory Approach, Content Analysis, and Sociological Jurisprudence through interviews with the West Kalimantan DLHK, Mining Inspectors, and civil society organizations, analyzed using the Theory of Authority and Soerjono Soekanto's Theory of Legal Effectiveness. Results show that centralization triggers a norm antinomy and regulatory vacuum in operationalizing RAD-PPM, necessitating vertical delegation of remaining authorities. Overcoming multidimensional barriers limited infrastructure, budgets, and miners' dependence on mercury requires strengthening Forkopimda as an integrative harmonizer, ensuring law enforcement is not merely repressive but also accommodative toward legalizing People's Mining Areas (WPR) and non-mercury technology substitution for sustainable ecological justice.

INTRODUCTION

The mining sector is one of the main pillars of Indonesia's economic development, mandated by Article 33 paragraph (3) of the 1945 Constitution for the prosperity of the people. However, on the other hand, this activity poses a serious threat to the sustainability of the ecosystem, particularly related to the use of hazardous chemicals such as mercury (Hg). As a country that has ratified the Minamata Convention through Law Number 11 of 2017, Indonesia has an international commitment to protect human health and the environment from anthropogenic mercury emissions and releases. This international commitment has since been scrutinized for its domestic consistency, particularly through analysis of mercury contamination cases such as the Buyat Bay pollution incident (Rayhan, 2023).

Domestically, this commitment is reinforced through the transformation of mining regulations in Law Number 3 of 2020 concerning Amendments to Law Number 4 of 2009 concerning Mineral and Coal Mining (Minerba Law). This regulation not only focuses on commodity governance but also emphasizes the obligation to reduce and eliminate mercury, particularly in Small-Scale Gold Mining (ASGM) and Illegal Gold Mining (PETI) activities. As a follow-up, regional governments are required to develop Regional Action Plans for Mercury Reduction and Elimination (RAD-PPM) to integrate central policies into local characteristics.

Indonesia's international commitment to addressing the negative impacts of mercury (Hg) in a formal legal manner began through the instrument of Law Number 11 of 2017 concerning the Ratification of the Minamata Convention on Mercury. This global ratification was transformed vertically into the national legal system through Presidential Regulation Number 21 of 2019 concerning the National Action Plan for the Reduction and Elimination of Mercury (RAN-PPM), which was then followed sectorally by Regulation of the Minister of Environment and Forestry Number P.81/MENLHK/SETJEN/KUM.1/10/2019 concerning the Implementation of Presidential Regulation Number 21 of 2019. This regulatory structure requires Regional Governments to prepare local legal instruments in the form of Regional Regulations (Perda) or Regional Head Regulations concerning Regional Action Plans (RAD-PPM) as a basis for determining baseline data on the use and circulation of mercury at the site level. This authority-sharing arrangement between central and regional governments has been identified as a recurring source of decentralization conflict within Indonesia's mineral and coal governance framework (Al-Farisi, 2021). However, following the enactment of Law Number 3 of 2020 concerning Amendments to Law Number 4 of 2009 concerning Mineral and Coal Mining (Minerba Law), a radical reconstruction of authority occurred through the withdrawal (centralization) of government affairs in the mining sector from the regions to the center. This legislative reality gave rise to a normative Legal Gap : on the one hand, regions are burdened with administrative-ecological obligations to reduce and eliminate mercury through environmentally based RAD-PPM, but on the other hand, the instrument for controlling licensing and supervising community mining operations has been amputated by Minerba Law Number 3 of 2020.

West Kalimantan Province is a crucial location on the national map of mercury use distribution. With abundant gold resources, mercury amalgamation remains the primary method (Basri et al., 2020; Kurniawan et al., 2023) for artisanal miners due to its low cost and simplicity. Consequently, West Kalimantan is listed as one of the regions with the highest levels of mercury contamination (Aji, 2023), leading to permanent damage to watersheds (Tomiyasu et al., 2019, 2020) and the threat of neurological and kidney disorders in communities surrounding mining sites (Harianja et al., 2020).

Although the West Kalimantan Provincial Government has responded by drafting the RAD-PPM document, its effective implementation following the enactment of the 2020 Mineral and Coal Mining Law remains elusive. The challenges faced are multidimensional, ranging from limited infrastructure for hazardous and toxic waste processing to social resistance stemming from the community's economic dependence on illegal mining (PETI), a dependency that recent studies confirm functions as a central strategy for family welfare in mining-affected communities (Junaidi, 2022). Without synchronization between law

enforcement and technical-economic solutions, the mercury elimination policy risks remaining a paper tiger on an administrative document.

Legal dynamics in the mining sector are often caught in a dichotomy between legal certainty and substantive justice for local communities. Theoretically, law should function as a tool of social engineering, capable of shifting community behavior away from the use of hazardous substances and toward environmentally friendly practices. However, in reality, top-down policies often fail to capture the complex sociological needs of miners on the ground, triggering tensions between formal regulations and real economic needs.

The main issue in the mercury eradication effort in West Kalimantan is closely related to the effectiveness of law enforcement, which is often partial. Law enforcement must not rely solely on a rigid, repressive approach but must address the root of the problem: the community's dependence on the informal sector. Without guarantees of livelihoods through substitution of livelihoods or technology, the mercury ban will continue to face resistance from those who feel their economic rights are being neglected by state policy.

The implementation of RAD-PPM also depends heavily on the integrity and professionalism of law enforcement officials and regional bureaucracies. Corruption and weak oversight in the mining sector are significant obstacles to achieving clean environmental governance. Environmental policies are often viewed as mere administrative procedures, while on-the-ground practices demonstrate the permissibility of illegal activities involving the use of hazardous chemicals for the benefit of a select few.

Furthermore, limited access to non-mercury gold processing technology is a technical obstacle that compounds the problem. Communities in areas like Sintang and Melawi tend to maintain amalgamation methods due to a lack of education and technical assistance from the government regarding safer alternatives (Meutia et al., 2022), a pattern also documented in comparable small-scale gold mining areas in West Java (Nuryanty et al., 2024). In this context, the state should not merely act as a punisher, but also as a solution provider (social service), facilitating technological transitions for artisanal miners, in accordance with the constitutional mandate to improve people's welfare without damaging the environment.

Another sociological challenge is the strong patronage within the social structure of illegal gold mining (PETI). Miners are often in the most vulnerable position, while the intellectual actors behind the illegal mercury trade are difficult to reach under the law. If the monitoring strategy within the RAD-PPM is unable to disrupt the mercury supply chain from upstream to downstream, the target of mercury elimination in the coming years will remain mere rhetoric, difficult to achieve in West Kalimantan.

Therefore, policy synchronization between the central and regional governments following the enactment of the 2020 Mineral and Coal Mining Law is crucial. The shift in licensing and oversight authority, which has been shifted to the central government, demands more intensive coordination to ensure that the RAD-PPM (Regional Development Planning) system does not lose its operational relevance. A collaborative governance model is needed, in which local communities are actively involved in decision-making and environmental oversight, to ensure that policies are aligned with ecological and social justice.

The transfer of mining management authority from regional to central governments following the enactment of Law No. 3 of 2020 carries profound legal implications for regional autonomy. Philosophically, this centralization should aim to standardize oversight standards

and minimize deviations at the local level. However, the effectiveness of the RAD-PPM depends heavily on how the central government can redistribute oversight instruments back to the regions through appropriate deconcentration mechanisms, ensuring that the mercury elimination policy does not lose its edge due to bureaucratic distance from mining sites.

In the context of mining law, environmental protection is inseparable from recognizing the existence of indigenous communities, who are often the first victims of mercury contamination. The state has a constitutional obligation to ensure that every regulation, including the RAD-PPM, provides space for the participation of local wisdom. Law enforcement that prioritizes only formalities without considering the social structure and traditional rights of communities surrounding river basins will only create prolonged agrarian and ecological conflicts.

Successful implementation of regulations in the field also requires synchronization between legal norms and the realities of the legal culture of mining communities. Often, regulations regarding restrictions on hazardous chemicals fail to be implemented due to a gap between what is written in the law (law on the books) and what is practiced in society (law in action). A humanistic and educational legal approach is needed, where enforcement of sanctions is a last resort (*ultimum remedium*) after the government has fulfilled steps to foster and provide adequate community mining facilities.

Furthermore, the state's responsibility in the mining sector must include remedial justice for those impacted by past mercury use. The RAD-PPM should not only focus on preventing new uses but also include a rehabilitation scheme for polluted land and rivers. This aligns with the principle of sustainable development, which mandates that the use of natural resources today must not compromise the health and quality of life of future generations, especially residents in remote areas of West Kalimantan.

Ultimately, stakeholder integration in overseeing the 2020 Mineral and Coal Mining Law is key to realizing equitable mining governance. Strong oversight must be coupled with easy access for small-scale miners to obtain formal legality through Community Mining Areas (WPR) and Community Mining Permits (IPR). By providing a clear legal framework, the government can more easily control and direct communities to abandon mercury use for the sake of ecosystem safety and long-term regional economic sustainability.

Although various studies have examined the implementation of the Minamata Convention in Indonesia, limited attention has been given to the legal harmonization challenges arising from the centralization of mining authority under Law Number 3 of 2020 and its impact on RAD-PPM implementation at the provincial level. Previous research has largely focused on technical aspects of mercury reduction without thoroughly analyzing the normative conflicts between environmental regulations and mining sectoral laws. Furthermore, the role of *Forkopimda* as an integrative governance instrument in bridging the regulatory vacuum has not been comprehensively studied. Manoppo (2021) examined the implementation of the Minamata Convention in North Sulawesi but did not specifically address the centralization issue under Law No. 3 of 2020. Pratama (2022) studied the effectiveness of RAN-PPM nationally without analyzing regional implementation constraints. Hidayat (2022) analyzed regional government authority in environmental supervision in the mining sector, yet his research focused on general supervision mechanisms rather than RAD-PPM implementation in West Kalimantan. These findings are consistent with broader evidence that legality status

remains an unresolved determinant of environmental and health outcomes at artisanal small-scale gold mining sites across Indonesia (Meutia et al., 2023). Lestari (2023) examined harmonization of environmental pollution control regulations following the Job Creation Law, but did not specifically address the mercury elimination policy gap. This gap underscores the need for research that specifically examines the juridical harmonization of mining laws post-centralization and the role of *Forkopimda* in ensuring effective RAD-PPM implementation in West Kalimantan, a region with unique geographical characteristics and high vulnerability to mercury contamination.

This normative misalignment has a direct impact on the reduced effectiveness of environmental law in the regions, particularly in West Kalimantan Province, which has a high level of dynamics related to illegal Small-Scale Gold Mining (ASGM). Therefore, legal harmonization efforts are needed to align these overlapping authorities. This governance synchronization cannot be carried out partially, but must involve the active role of the *Forkopimda* (Regional Leadership Coordination Forum) as the aligner and implementer of integrative environmental protection policies (environmental governance), which bridges the regulatory vacuum between vertical ministries at the central level and law enforcement officials and civil servants at the regional level.

Based on this urgency, this study focuses on analyzing how the implementation of RAD-PPM in West Kalimantan runs under the legal umbrella of the 2020 Minerba Law. The researcher intends to map structural and sociological obstacles in the field in order to formulate effective monitoring strategies and technology substitution solutions to realize a mercury-free West Kalimantan. This study aims to analyze the juridical harmonization of the legal gap arising from the centralization of mining authority under Law Number 3 of 2020 and to formulate strengthened *Forkopimda* governance to address obstacles in the ecological supervision of community mining in West Kalimantan. Specifically, this research seeks to examine the legal framework governing the division of authority between central and regional governments in mining and environmental management, to identify operational constraints including juridical, structural, sociological, and geographical barriers in RAD-PPM implementation, and to formulate responsive governance protocols through the optimization of *Forkopimda*'s role as an integrative harmonizer in conservation and environmental law enforcement.

The benefits of this research are both theoretical and practical. Theoretically, this study contributes to the development of legal theory concerning inter-institutional coordination in environmental law enforcement and provides a foundation for future research on legal harmonization in the mining sector. Practically, the findings are expected to provide recommendations for policymakers, particularly the Ministry of Energy and Mineral Resources, the Ministry of Environment and Forestry, and regional governments, in formulating more effective coordination protocols. Furthermore, this research offers operational guidance for law enforcement officers and regional bureaucracies in enhancing inter-agency cooperation to achieve mercury elimination targets.

METHOD

The research method was a series of systematic and planned steps used to examine legal issues in depth. Given the complexity of the issues surrounding environmental policy

implementation amidst changes in the mining authority regime, this study uses the Legal Research Method. Normative-Empirical. This method combines a normative approach to examine the synchronization of laws and regulations (positive legal studies) and an empirical approach to observe how law works in society (field studies).

A normative approach (law on the books) is used to examine the horizontal and vertical synchronization of laws and regulations related to the withdrawal of authority in the mineral and coal sector. Meanwhile, an empirical approach (law in action) is used to observe the actual operation of the law, the effectiveness of the bureaucracy, and the dynamics of mercury reduction policy implementation within the community and relevant agencies.

This study uses qualitative research methods to holistically and contextually understand the shift in authority following the enactment of Law No. 3 of 2020. The qualitative approach in legal research aims to in-depth describe the reality of RAD-PPM implementation in West Kalimantan Province and the coordination barriers that arise between central and regional authorities.

This research goes beyond a textual analysis of the mercury elimination regulation (Presidential Decree No. 21 of 2019) and the latest Mineral and Coal Mining Law. It also explores how the West Kalimantan Provincial Government operationalizes its regional action plan amidst limited mining oversight authority. This is done to find a coordination model that ensures legal certainty and environmental protection from exposure to hazardous substances.

Research Approach

In order to obtain comprehensive data, this normative-empirical legal research uses several approaches:

1. Statute Approach: Examining regulations in the mineral and coal sector, regional government, and environmental management.
2. Content Analysis Approach: Textually analyzing formal legal documents, especially the West Kalimantan RAD-PPM document.
3. Sociological Jurisprudence Approach: Conducting direct observations in the field to map sociological facts, administrative obstacles, and the effectiveness of environmental supervision after the centralization of authority.

Data Types and Sources

In accordance with the character of normative-empirical research, the data collected in this research consists of two types, namely:

1. Primary data is the primary data obtained directly from primary sources in the field (field research). The primary data in this study were obtained through non-participant observation of conditions in mining-affected areas in West Kalimantan and in -depth interviews with key informants, including:
 - 1) Officials from the Environment and Forestry Service (DLHK) of West Kalimantan Province
 - 2) Mining Inspector of the Ministry of Energy and Mineral Resources who is stationed in the West Kalimantan region.
 - 3) Representatives of local communities or civil society organizations (NGOs) that focus on local environmental issues.

2. Secondary data is used as the basis for normative analysis to examine applicable legal norms. Secondary data in this legal research is classified as follows:
 - 1) Primary Legal Materials: Legal materials that are authoritative and binding, including:
 - i. The 1945 Constitution of the Republic of Indonesia
 - ii. Law No. 32 of 2009: Concerning Environmental Protection and Management as amended by Law No. 6 of 2023 concerning Job Creation
 - iii. Law No. 23 of 2014: Concerning Regional Government
 - iv. Law no. 11 of 2017 concerning Ratification of the Minamata Convention on Mercury
 - v. Law No. 3 of 2020: Amendment to Law No. 4 of 2009 concerning Mineral and Coal Mining
 - vi. Government Regulation No. 96 of 2021 concerning the Implementation of Mineral and Coal Mining Business Activities
 - vii. Presidential Decree No. 21 of 2019: Concerning the National Action Plan for the Reduction and Elimination of Mercury (RAN-PPM)
 - viii. Regulation of the Minister of Environment and Forestry Number P.81/MENLHK/SETJEN/KUM.1/10/2019 concerning the Implementation of Presidential Regulation Number 21 of 2019.
 - 2) Secondary Legal Materials: Materials that provide explanations regarding primary legal materials, in the form of environmental law literature, legal journals, previous research results on decentralization, and technical reports on the impact of mercury exposure in West Kalimantan.
 - 3) Tertiary Legal Materials: Materials that provide guidance and explanations for primary and secondary legal materials, such as law dictionaries (Black's Law Dictionary), encyclopedias, and bibliographies related to mining issues.

Data collection technique

Data collection was adapted to the characteristics of the normative-empirical data type, which is divided into two main techniques. Literature review was conducted by searching documents, RAD-PPM achievement reports, and literature available both physically and electronically in university libraries and digital databases of relevant agencies. Research was also conducted on scientific journals relevant to the conflict between central and regional authorities.

Field data collection techniques were conducted through in-depth interviews with key informants to obtain data on the obstacles to implementing RAD-PPM after mining authority was transferred to the central government. Data analysis was conducted using a descriptive-analytical approach, systematically compiling data to address questions regarding the effectiveness of regional environmental protection policies following the enactment of Law No. 3 of 2020.

Data analysis

All legal (normative) materials and field (empirical) data that have been classified thematically are then analyzed using descriptive-qualitative analysis methods. Data processing is carried out by reducing field data, presenting it systematically, and then critically examining it using the theory of authority, the concept of decentralization, and the principles of

environmental law. The main focus of this analysis is to uncover the gap between what is aspired to by the law textually (*das sollen*) and the reality of the operationalization of environmental law enforcement in the region (*das sein*). Based on this analysis, this study draws prescriptive conclusions to produce a new formula or alternative coordination model that guarantees ecological legal certainty in the elimination of mercury in the region.

RESULTS AND DISCUSSION

Legal Analysis of the Legal Gap Alignment of Centralized Authority in Law No. 3 of 2020 with the Implementation of RAD-PPM in West Kalimantan

The enactment of Law No. 3 of 2020 concerning Amendments to Law No. 4 of 2009 concerning Mineral and Coal Mining (Law No. 3 of 2020) ushered in a new paradigm in mining governance in Indonesia: the centralization of authority. This regime transferred almost all authority over mineral and coal (*minerba*) management, previously held by regional governments, back to the central government. This centralization created a significant legal gap at the regional level (Rahayu & Faisal, 2021; Utami, 2023), particularly in the implementation of concurrent affairs related to society and the environment. Regional governments now lack the executive legitimacy to directly intervene in the mining sector, even though the socio-economic impacts of these activities occur directly within their jurisdiction.

legal gap is particularly evident in the implementation of the Regional Action Plan for Community Development and Empowerment (RAD-PPM) in West Kalimantan Province. On the one hand, the RAD-PPM is a strategic regional instrument to ensure that natural resource exploitation contributes significantly to local community welfare and sustainable development. On the other hand, this instrument lost its legal anchor when higher-level regulations completely curtailed regional authority in the mineral and coal sector. Consequently, legal uncertainty arose regarding the extent to which the West Kalimantan Provincial Government could enforce compliance by mining business permit (IUP) holders to align their Corporate Social Responsibility (CSR) programs with the regional development targets outlined in the RAD-PPM.

Therefore, legal harmonization efforts are needed to bridge this gap so that the implementation of RAD-PPM does not stagnate and lose its binding power. This harmonization should not be seen as a form of regional defiance against the principle of centralization, but rather as an effort to fill the legal vacuum for the benefit of the local public interest. One approach that can be taken is to reinterpret the concept of regional autonomy, which guarantees the right of regions to regulate their household affairs as long as it does not conflict with the national interest. This legal harmonization is crucial to transforming norm conflicts into integrative governance collaboration between the central government, regions, and business actors.

Reconstruction of the Attribution of Authority in the Mineral and Coal Sector Following the Enactment of Law Number 3 of 2020

The enactment of Law No. 3 of 2020 has radically reconstructed the structure of authority attribution in the mineral and coal mining sector in Indonesia. Through the provisions of Article 4 paragraph (2) of the law, control of mineral and coal by the state is carried out by the Central Government. This restructuring automatically cancels or revokes (revocation) the authority to grant permits, guidance, and supervision that was previously attached to the

Governor based on Law No. 23 of 2014 concerning Regional Government. Theoretically, this reconstruction changes the legal landscape from one that was originally decentralized-proportional to one that is centralized-absolute, where regions are positioned merely as spectators of the exploitation of resources in their own regions.

The sociological-legal implications of this attribution reconstruction are the emergence of stagnant coordination between mining business actors and regional governments. When supervisory authority was shifted to the central government, remote social and environmental control by the Ministry of Energy and Mineral Resources proved less effective than in-depth oversight by regional technical agencies. This legal reconstruction ignores the fact that mining ecosystems are inseparable from regional spatial, socio-cultural, and economic planning. As a result, regions bear the ecological and social burdens of mining activities but lack the legal instruments to enforce or direct IUP holders to contribute to local community development.

In the context of state administrative law, this reconstruction of authority requires a reinterpretation of the remaining residual powers still held by regions. Although core mining business authority has been centralized, regional governments still retain attributional authority in the areas of social welfare, employment, and regional development. Therefore, legal reconstruction following Law No. 3 of 2020 must be placed within an integrative framework of general government affairs. Regional governments must be able to formulate legitimate legal discretionary spaces to link their autonomous authority to advance community welfare with the activities of mining corporations operating within their jurisdictions.

Legal Existence of West Kalimantan Governor Regulation Number 61 of 2020 concerning RAD-PPM in the Hierarchy of Legislation

West Kalimantan Governor Regulation Number 61 of 2020 concerning RAD-PPM (Pergub Kalbar No. 61/2020) has a unique and vulnerable legal position and existence in the hierarchy of laws and regulations in Indonesia. Referring to Article 8 paragraphs (1) and (2) of Law Number 12 of 2011 concerning the Formation of Legislation, the Governor's Regulation is recognized and has binding legal force as long as it is ordered by higher laws and regulations or is formed based on authority. The existence of this Governor's Regulation is formally valid because it was formed by the Governor as the regional head to carry out government affairs that are regional household affairs, especially in the context of regional development planning and community empowerment.

An existential challenge arises when linked to the principle of *lex superior derogat legi inferior* (higher regulations override lower regulations). Considering that Law No. 3 of 2020 has transferred authority over mining and coal to the central government, the binding force of West Kalimantan Governor Regulation No. 61/2020 on mining business actors is often questioned by industry players. Hierarchically, the Governor Regulation cannot override or add new obligations not regulated by higher laws. Nevertheless, the legal existence of this Governor Regulation remains strong when placed within the supporting material legal framework, where this Governor Regulation does not regulate the substance of mining permits, but rather regulates the socio-economic downstream aspects (PPM), which are part of the regional government's mandatory duties in improving the welfare of its people.

To ensure the legal existence of West Kalimantan Governor Regulation No. 61/2020 remains rigid and enforceable amidst the current of centralization, harmonization of legal interpretation is necessary. This Governor Regulation must be viewed as a sectoral regulation

based on regional autonomy authority in the socio-economic sector, which functions to strengthen and localize the PPM blueprint established by the Ministry of Energy and Mineral Resources. Thus, the position of the RAD-PPM Governor Regulation in the regulatory hierarchy does not stand vis-à-vis Law No. 3 of 2020, but rather acts as a complementary regulation that fills the technical-specific spaces that are not covered by regulations at the central level for the benefit of protecting local communities in West Kalimantan.

The Antinomy of Norms and Regulatory Vacuum in the Supervision of Mercury Use in the Community Mining Sector

The antinomy of legal norms in environmental and mining governance in Indonesia has become increasingly acute following the enactment of Law Number 6 of 2023 concerning Job Creation, which amends Law Number 32 of 2009 concerning Environmental Protection and Management (UU PPLH). Normatively, the PPLH Law and Law Number 11 of 2017 concerning the Ratification of the Minamata Convention on Mercury mandate absolute protection of ecological spaces from exposure to hazardous waste and a total ban on the circulation of mercury. However, the centralistic clauses in Law Number 3 of 2020 and Government Regulation Number 96 of 2021 have created a complex bureaucratic maze in the legalization process for Community Mining Areas (WPR) and Community Mining Permits (IPR). As a result, a philosophical clash has emerged: environmental law demands an immediate halt to pollution, while the mineral and coal law restricts regional opportunities to legalize and develop local miners to break free from mercury dependence. This phenomenon of operational legal vacuum (regulatory vacuum) was confirmed in real terms by the Mining Inspectors who are at the forefront of regional supervision.

Based on an in-depth interview with Mr. Ahmad Faisal, ST, as the Coordinator of Mining Inspectors for the Ministry of Energy and Mineral Resources for the West Kalimantan Region, he explained the reality of this dilemma: "We in the field face a very paradoxical situation. On the one hand, we know there is a national instruction through Presidential Decree No. 21 of 2019 to eliminate mercury in the artisanal mining sector. However, on the other hand, the quota for Mining Inspector personnel throughout West Kalimantan is less than twenty people to supervise thousands of mining points. When the Regional Government relinquished supervision due to being hampered by Law No. 3 of 2020, the burden shifted to us, even though our instruments for enforcing administrative sanctions are very limited because the procedures for issuing IPRs from the center are still bureaucratically stalled. As a result, supervision of mercury use in artisanal mining areas has become a gray area that is untouched by both the center and the regions." (Interview on April 22, 2026).

The description above clearly reflects the legal dissonance occurring at the implementation level. When analyzed using the Theory of Authority, the unclear boundary between technical mining supervision (which is drawn to the center) and environmental impact supervision (which should be attached to the regions based on the principles of *freies ermesen* and regional autonomy) has given rise to dysfunctional administrative law enforcement, reflecting a broader pattern of legislative disharmony that omnibus-style harmonization instruments in Indonesia have yet to fully resolve (Fitryantica, 2019). The conflicting norms (antinomy) between a progressive environmental legal regime and a centralistic-capitalist mining regime triggers structural stagnation. The absence of implementing regulations that synchronize the role of supervision at the ground level allows a regulatory vacuum to continue

to exist, so that the RAD-PPM document loses its material enforceability (the ecological pacta sunt servanda is not fulfilled) because the law fails to provide a coherent institutional means to enforce it.

Legal Implications of Presidential Regulation Number 55 of 2022 on the Ambiguity of Administrative Legal Accountability in the Regions

The enactment of Presidential Regulation No. 55 of 2022 concerning the Delegation of Business Licensing in the Mineral and Coal Mining Sector (Presidential Regulation No. 55/2022) was intended as a solution to unravel bureaucratic bottlenecks resulting from the extreme centralization of Law No. 3 of 2020. However, this delegation instrument has instead given rise to new legal implications in the form of ambiguity regarding administrative legal responsibility at the regional level. In the doctrine of state administrative law, the concept of delegation shifts not only authority but also legal responsibility from the delegator (Central Government) to the delegatee (Regional Government). The ambiguity arises because the delegation granted by this Presidential Regulation is very partial while crucial supervisory functions, such as the existence of Mining Inspectors, legally remain under the command and full appointment of the central Ministry of Energy and Mineral Resources.

This structural imbalance creates a situation where the West Kalimantan Provincial Government is entrusted with administrative responsibility for permit issuance, but faces a paralysis in law enforcement due to the lack of a supervisory apparatus structurally loyal to the region. When administrative violations or environmental disputes arise from the delegated permit holders, the lines of accountability between regional and central agencies become blurred. The region is often the first line of defense against administrative lawsuits or social protests from local communities, even though the final control instruments and sanctions remain held hostage by central regulations. Consequently, Presidential Regulation No. 55/2022 does not address the legal gap, but instead creates overlapping responsibilities that reduce legal certainty and weaken the effectiveness of environmental law enforcement in West Kalimantan.

Analysis of the Effectiveness of Environmental Law and Barriers to the Implementation of RAD-PPM in West Kalimantan Province

Analyzing the effectiveness of environmental law within the framework of the implementation of the Regional Action Plan for Community Development and Empowerment (RAD-PPM) in West Kalimantan requires a comprehensive analytical tool. Referring to legal system theory, legal effectiveness is not solely measured by the existence of normative texts, but rather by the dynamic interaction between legal substance, the structure of law enforcement officials, and the legal culture of the community. In the context of West Kalimantan, the implementation of RAD-PPM often hits a thick wall because existing environmental legal instruments have not been able to harmoniously integrate aspects of ecological protection with the socio-economic obligations of mining corporations. As a result, environmental law appears to operate rigidly alone as an administrative-procedural instrument, while the mandate of the welfare of communities around the mine, promoted by RAD-PPM, is neglected.

The main obstacle to achieving this effectiveness stems from the dilemma between the target of regional economic growth based on commodity extraction and the commitment to preserving local ecosystems. The West Kalimantan Provincial Government, on the one hand, is burdened with moral and administrative responsibility to achieve the sustainable development targets outlined in the RAD-PPM, but on the other hand, lacks strong legal

oversight to enforce corporate compliance. This obstacle is further exacerbated by West Kalimantan's vast geographic area and limited oversight, leading to a disconnect between the RAD-PPM planning on paper and the reality of environmental restoration on the ground. Without synchronization and a commitment to cohesive law enforcement, regional environmental law will continue to experience functional paralysis in overseeing community empowerment programs.

Legal Substance Variable: Synchronization of Mining Sectoral Regulations with Environmental Feasibility Standards

From a legal substance perspective, the fundamental obstacle to the implementation of RAD-PPM in West Kalimantan stems from the chronic disharmony between mining sectoral regulations and environmental feasibility standards. Law Number 3 of 2020 and its derivative regulations tend to be designed with an exploitative nature, emphasizing ease of investment and simplification of business permits. This character often negates or relaxes the strict precautionary principle mandated by Law Number 32 of 2009 concerning Environmental Protection and Management (UU PPLH). This finding echoes broader observations of inconsistency in the regulation of corporate social and environmental responsibility across Indonesian legislation (Hidayat et al., 2020). This lack of synchronization of norms creates legal loopholes where mining companies can fulfill administrative mining obligations to maintain their permits, without truly fulfilling the substance of long-term environmental feasibility.

The direct impact of this weak regulatory synchronization is the blurring of environmental-based PPM achievement indicators in regional policies. Amdal documents or Environmental Management and Monitoring Measures (UKL-UPL) are often treated merely as formalities to supplement central licensing documents, rather than as the primary database for formulating contextual RAD-PPM programs in West Kalimantan. When central mining regulations strictly separate mining business affairs from environmental and social matters at the regional level, the provincial government loses the legal and formal basis for requiring corporations to allocate PPM funds to community-based environmental restoration programs, such as watershed restoration or revegetation of former community mining areas.

Law Enforcement Variables: Administrative and Apparatus Readiness at the Field Level

The transfer of authority for mineral and coal mining management to the central government through the enactment of Law Number 3 of 2020 theoretically triggered a widening of the span of control, which weakened the environmental oversight function in the regions. Normatively, the Regional Action Plan for Mercury Reduction and Elimination (RAD-PPM) document for West Kalimantan Province is an ecological mandate that must be implemented to achieve the target of 100% mercury elimination in the Small-Scale Gold Mining (ASGM) sector. However, the reduction in regional authority after centralization gave rise to a contrasting gap between what is aspired to by law (law on the books) and the reality of implementation on the ground (law in action). To test the operational feasibility and effectiveness of the RAD-PPM implementation at the field level following the regulatory changes, researchers conducted empirical investigations through in-depth interviews with relevant policymakers.

Based on the results of an interview with a representative of the Environment and Forestry Service (DLHK) of West Kalimantan Province, namely Mr. Ir. Hermawan, M.Sc. as

Head of the Environmental Monitoring Division, it was revealed that: "Since the enactment of Law No. 3 of 2020, we in the region have experienced logistical and authority paralysis to carry out integrated enforcement and guidance at ASGM locations. The monitoring budget sourced from the Regional Budget (APBD) has been drastically cut because legally this authority is no longer a concurrent regional matter. As a result, the mercury elimination target in the RAD-PPM as stipulated in Governor Regulation Number 61 of 2020 has become merely a document on paper because the DLHK does not have direct access to intervene or monitor mining areas without lengthy bureaucratic coordination with Jakarta." (Interview on April 14, 2026).

The empirical facts above demonstrate an anomaly in the legal structure of environmental law enforcement in West Kalimantan. Analyzing it using Lawrence M. Friedman's Theory of Legal Effectiveness, the failure of the RAD-PPM implementation stems from the dysfunctional legal substance resulting from institutional disharmony. When laws are centralized, the local legal structure (DLHK) loses its enforcement legitimacy, while the replacement structure established by the central government (Ministry of Energy and Mineral Resources) lacks sufficient personnel to cover West Kalimantan's vast geographical area.

authority vacuum is exacerbated by the stalled collaborative governance channels between the central and regional governments. The unclear division of oversight between the mining sector (which is sectoral-centralized) and the environmental impacts (which are inherent to the regions based on Law No. 32 of 2009) creates a gray area that is exploited by illegal gold mining (PETI) actors to continue using mercury freely. Therefore, without local policy innovation in the form of optimizing the role of the West Kalimantan Regional Leadership Communication Forum (*Forkopimda*) as an integrative bridge, the regulation on preventing environmental pollution due to mercury will continue to experience structural and sociological dysfunction.

Supporting Facilities and Infrastructure Variables: Infrastructure Limitations and Access to Non-Mercury Substitution Technology

The effectiveness of a public policy is never based solely on the perfection of the legal text, but rather depends heavily on the availability of physical instruments and the substitution technologies that surround it. In the context of the implementation of RAD-PPM in West Kalimantan, the commitment to achieving zero mercury directly confronts the thick wall of limited alternative gold processing facilities. Researchers conducted non-participant observation in one of the areas affected by artisanal mining along the West Kalimantan river to assess the availability of environmentally friendly technologies. Based on direct observations, traditional miners still use the traditional mercury-based amalgamation method openly on the riverbank, without a standard waste (tailings) treatment system. The absence of supporting infrastructure and access to technology is reinforced by the perspectives of civil society representatives who accompany the local mining community.

According to Maria Anastasia, SH, Executive Director of the non-governmental organization (NGO) Borneo Green Watch, these facility constraints are at the root of the ecological transition's failure: "The local government banned the use of mercury through Governor Regulation No. 61 of 2020, but never provided concrete solutions on the ground. Non-mercury gold processing equipment such as shaking tables, magnetic separators, or integrated cyanidation cost tens to hundreds of millions of rupiah, something that small-scale miners cannot afford independently. Furthermore, the local laboratory owned by the

Environment and Forestry Agency (DLHK) does not have the capacity to regularly test river water quality standards for mercury contamination due to limited reagents and post-centralization treatment budgets. Demanding that communities stop using mercury without providing replacement facilities is like telling them to stop eating." (Interview on May 5, 2026)

Through the analytical knife of Soerjono Soekanto's Theory of Legal Effectiveness (Suryanto et al., 2024), especially on the variable of Supporting Facilities or Infrastructure, this empirical reality proves that the absence of infrastructure support can absolutely paralyze the binding power of law (law enforcement). A law that prohibits an act (the use of mercury) but fails to provide rational substitute facilities for the community will only give rise to mass legal disobedience (widespread non-compliance). The absence of adequate testing laboratories and environmentally friendly gold processing technology creates an imbalance between the ideal legal substance and minimal supporting facilities. As a result, the goal of RAD-PPM to protect river ecosystems from heavy metal accumulation cannot be realized, because the existing material facilities are unable to bridge the socio-economic transformation of traditional mining communities.

Societal and Legal Culture Variables: PETI Patronage Structure and Socio-Economic Dependence of Traditional Miners

Turning to the variables of society and legal culture, the implementation of RAD-PPM in West Kalimantan is faced with the sociological reality of the proliferation of Illegal Gold Mining (PETI) and traditional sand mining. These activities can no longer be viewed purely as mining crimes, but have become entrenched as alternative livelihood systems due to the very high socio-economic dependence of local communities. The legal culture of the community considers that utilizing natural resources in their customary lands or traditional territories is a living constitutional right (living law), whose moral standing is considered higher than positive state law which limits their access through complicated and expensive licensing instruments. This finding aligns with evidence that administrative crackdowns on illegal gold mining tend to fail when they are not accompanied by structural solutions to the underlying economic incentives that sustain such activities (Sari & Mubarak, 2020).

The biggest obstacle to changing this legal culture is the existence of patronage structures that grip the illegal mining ecosystem. This non-procedural artisanal mining sector is generally controlled by a network of informal actors who act as patrons for traditional miners (clients). This patronage structure provides capital, equipment, and instant market access that government bureaucratic schemes cannot. As a result, the economic incentives and social protections provided by these patronage networks are far more concrete for communities than the promises of long-term empowerment offered in the RAD-PPM. This situation is why programs for economic transition or formalization of artisanal mining areas (WPR) within the RAD-PPM have consistently hit a dead end.

Harmonization of the Governance of the *Forkopimda* of West Kalimantan Province as an Instrument for Aligning Central and Regional Authorities

The Regional Leadership Coordination Forum (*Forkopimda*) of West Kalimantan Province plays a crucial role as an institutional bridge to unravel the communication blockages caused by the centralization of authority following Law No. 3 of 2020. Based on Law No. 23 of 2014 concerning Regional Government, *Forkopimda* was formed to support the smooth implementation of general government affairs that are not delegated to the regions, a

coordinating role that studies show has increasingly expanded beyond ceremonial functions into substantive cross-sectoral problem-solving (Azikin, 2019). In the context of the chaotic governance of the mining sector and the implementation of the Regional Action Plan for Community Development and Empowerment (RAD-PPM), *Forkopimda*, whose members include the Governor, the Chief of Police, the Regional Military Commander, the Chief of the High Prosecutor's Office, and leaders of other vertical agencies, must be transformed from a mere ceremonial forum into an active instrument for policy harmonization. This forum becomes a strategic space to align the national strategic agenda of the Central Government with the socio-ecological protection interests faced by the West Kalimantan Provincial Government.

Harmonizing governance through the Regional Leadership Communication Forum (*Forkopimda*) is urgently needed to address the negative impacts of the legal vacuum of regional government actions on the ground. When regions lack the administrative capacity to prosecute mining violations or compel corporations to align their Community Empowerment Programs (PPM), *Forkopimda* can use its collective authority to perform cross-sectoral oversight functions. Through this forum, the Governor can consolidate the law enforcement powers of the Regional Police (Polda) and the West Kalimantan High Prosecutor's Office to ensure that all natural resource extraction activities continue to operate in harmony with security stability, legal compliance, and the fulfillment of local community rights as mandated by the RAD-PPM.

The Relevance of the Role of *Forkopimda* in Bridging the Ecological Regulatory Vacuum

The sectoral powerlessness experienced by regional technical agencies due to the wave of centralization of the Mineral and Coal Mining Law demands the emergence of unconventional institutional strategic reorientation. When the formal bureaucratic channels between regional agencies and central ministries experience a coordinative deadlock, horizontal coordination instruments based on local state administration become an urgent option. The Regional Leadership Coordination Forum (*Forkopimda*) of West Kalimantan Province has strong sociological and legal legitimacy to fill this ecological control vacuum. *Forkopimda* should no longer be viewed merely as a ceremonial security forum, but must be reconstructed as a collaborative governance forum to oversee national strategic agendas, including mercury elimination as mandated by Presidential Decree No. 21 of 2019.

Responding to the potential for optimizing this institution, an official from the West Kalimantan Provincial Environment and Forestry Service (DLHK) reiterated the importance of cross-sectoral consolidation: "We in the technical service have run out of administrative space to regulate the circulation of illegal mercury in remote areas of West Kalimantan due to limited authority. The only way to revive this RAD-PPM is to bring this issue to the *Forkopimda* table. If the Governor can sit down with the Regional Police Chief to agree on the perception that saving rivers from mercury is part of regional resilience, then a joint intelligence operation can be formed to cut off the mercury supply lines in illegal ports, while we from the DLHK accompany the environmental recovery side. Without the integrated command power of *Forkopimda*, it is impossible to penetrate the sectoral egos of the central and regional governments." (Follow-up Interview, May 2026).

Theoretically, the active involvement of the Regional Leadership Communication Forum (*Forkopimda*) as an anchor for local policy aligns with the concept of Ecological Justice and the Responsive Law paradigm. When formal positive law is paralyzed by post-

centralization regulatory egoism, institutional discretion is needed that can act responsively to the threat of irreversible environmental damage. In this case, the *Forkopimda* functions as a bridging institution that unites fragmented legal subsystems. This synergy allows law enforcement to proceed in a non-partial manner; the police enforce criminal law against large-scale mercury smugglers (upstream), while the local government carries out the function of facilitating environmental development and restoration (downstream). This *Forkopimda*-based policy integration restores the authority of regional autonomy law that was previously reduced, while ensuring that the protection of the right to a clean environment for the people of West Kalimantan can be maintained amidst the dynamics of the transition of central authority.

Integrated Law Enforcement Formulation: Synergy of Repressive-Precision Actions and Preventive-Educative Approaches

The formulation of integrated law enforcement in West Kalimantan can no longer rely on a single, rigid approach. Facing the complexity of mining issues, particularly the phenomenon of Illegal Gold Mining (PETI) and artisanal stone/sand mining, the Regional Leadership Communication Forum (*Forkopimda*) must formulate a synergy between precise repressive measures and an educational, preventive approach. These precise repressive measures must be directed firmly at intellectual actors, financiers (*cukong*), large-scale collectors of illegal proceeds, and heavy equipment support networks that have been destroying ecosystems and exploiting local workers for personal gain. This criminal and administrative law enforcement must be carried out indiscriminately to dismantle the illegal patronage structures that erode the state's authority.

For traditional miners trapped in subsistence economic dependence, the state must be present with a humane approach through a preventative-educational approach. Regional governments, along with local police and military district commanders, need to prioritize guidance, outreach on the dangers of environmental damage (such as mercury pollution), and assistance with the procedures for managing People's Mining Areas (WPR) and People's Mining Permits (IPR). This synergy ensures that the law is not merely a punitive tool that creates new horizontal conflicts in society, but rather functions as a means of social engineering (law as a tool of social engineering) that guides communities from non-procedural activities to legal and safe use of space.

Model of Policy Integration Based on Ecological Justice and Local Economic Sustainability

The visionary step that must emerge from the harmonization of the West Kalimantan Regional Leadership Communication Forum (*Forkopimda*) is the establishment of a policy integration model based on the principles of ecological justice and local economic sustainability. Ecological justice demands that nature not be viewed as a mere commodity, but rather as a living entity whose right to sustainability must be protected for future generations, where the burden of environmental damage must not be placed on indigenous communities or vulnerable groups in the mining area. This model is realized by integrating the RAD-PPM document into a strict regional spatial and environmental control instrument, so that the carrying capacity and environmental capacity of West Kalimantan become absolute limits that cannot be violated by any mining business permit.

At the same time, ecological justice must go hand in hand with ensuring the sustainability of local communities' economies. This policy integration directs mining

corporations, through their Community Empowerment and Community Development (PPM) and Corporate Social Responsibility (CSR) funds, to move beyond providing short-term charitable assistance to investing in post-mining economic transformation, consistent with recommendations that corporate PPM and CSR funds be channeled into structured community development and empowerment programs rather than ad hoc assistance (Rahayu & Yetniwati, 2021). These funds should be allocated to finance alternative programs such as ecological agriculture, silvofishery, empowering MSMEs based on local wisdom, and restoring ex-mined land to productive areas managed by indigenous communities or villages. With this integrated model, West Kalimantan can break the chain of dependence on the destructive extractive sector while simultaneously building economic resilience that is independent, equitable, and in harmony with environmental sustainability.

CONCLUSION

The enactment of Law Number 3 of 2020 has shifted mining management, licensing, and supervision from regional governments to the Central Government, creating a legal gap for the West Kalimantan Provincial Government. Although the province remains responsible for reducing and eliminating mercury through the Regional Action Plan for Mercury Reduction and Elimination (RAD-PPM), it has limited authority to control mining licenses and supervise community mining activities. This situation has weakened the role of the provincial RAD-PPM because, under Article 179 of Law Number 3 of 2020, mining companies must follow the Community Development and Empowerment (PPM) blueprint established by the Minister of Energy and Mineral Resources rather than the Governor. Presidential Regulation Number 55 of 2022, which delegates certain mining permits such as IPR and SIPB to the Governor, has also not fully resolved this legal uncertainty. The transfer of Mining Inspectorate functions to the Ministry of Energy and Mineral Resources has further reduced direct supervision in the field. Therefore, the role of *Forkopimda* (Governor, Police Chief, Military Commander, and Head of the High Prosecutor's Office) is important in bridging this governance gap through coordination, preventive law enforcement, public education, and assistance for traditional miners in obtaining legal mining areas (WPR) and permits (IPR). In West Kalimantan, this approach is particularly important because communities depend on small-scale gold mining and illegal mercury distribution is supported by strong local networks. *Forkopimda* can also encourage mining companies to use PPM and CSR funds not only for short-term assistance but also for alternative livelihood programs and the adoption of safer, non-mercury gold processing technologies, thereby balancing environmental protection with local economic sustainability.

REFERENCES

- Aji, T. B. (2023). Distribusi spasial pencemaran merkuri di DAS Sungai Mempawah, Kalimantan Barat [Master's thesis, IPB University]. IPB University Scientific Repository. <http://repository.ipb.ac.id/handle/123456789/116728>
- Al-Farisi, M. S. (2021). Desentralisasi kewenangan pada urusan pertambangan mineral dan batubara dalam Undang-Undang Nomor 3 Tahun 2020. *Jurnal Ilmiah Ecosystem*, 21(1), 20–31. <https://doi.org/10.35965/eco.v21i1.699>
- Azikin, A. (2019). Peran forum koordinasi pimpinan daerah dalam penyelenggaraan otonomi khusus di Provinsi DKI Jakarta. *Jurnal Ilmu Pemerintahan Widya Praja*, 44(2), 139–154. <https://doi.org/10.33701/jipwp.v44i2.254>

- Basri, Sakakibara, M., & Sera, K. (2020). Mercury in soil and forage plants from artisanal and small-scale gold mining in the Bombana area, Indonesia. *Toxics*, 8(1), Article 15. <https://doi.org/10.3390/toxics8010015>
- Fitryantica, A. (2019). Harmonisasi peraturan perundang-undangan Indonesia melalui konsep omnibus law. *Gema Keadilan*, 6(3), 300–316. <https://doi.org/10.14710/gk.2019.6751>
- Harianja, A. H., Saragih, G. S., Fauzi, R., Hidayat, M. Y., Syofyan, Y., & Tapriziah, E. R. (2020). Mercury exposure in artisanal and small-scale gold mining communities in Sukabumi, Indonesia. *Journal of Health & Pollution*, 10(28), 1–11. <https://doi.org/10.5696/2156-9614-10.28.201209>
- Hidayat, R., Yahya, A., Ernis, Y., & Adli, M. (2020). Analisis yuridis tanggung jawab sosial dan lingkungan perusahaan terhadap masyarakat sekitar. *Jurnal Penelitian Hukum De Jure*, 20(4), 531–544. <https://doi.org/10.30641/dejure.2020.v20.531-544>
- Junaidi, J. (2022). Pertambangan emas tanpa izin (PETI) dan kesejahteraan keluarga di sekitar wilayah pertambangan. *E-Jurnal Ekonomi Sumberdaya dan Lingkungan*, 11(1), 61–74. <https://doi.org/10.22437/jels.v11i1.18988>
- Kurniawan, I. A., Abdurrachman, M., Basuki, N. I., Sucipta, I. G. B. E., & Arifa, A. N. (2023). Mercury exposure from artisanal small-scale gold mining in Bunikasih, West Java, Indonesia. In A. Kallel et al. (Eds.), *Selected studies in environmental geosciences and hydrogeosciences (CAJG 2020, Advances in Science, Technology & Innovation)*. Springer. https://doi.org/10.1007/978-3-031-43803-5_21
- Meutia, A., Lumowa, R., & Sakakibara, M. (2022). Indonesian artisanal and small-scale gold mining—A narrative literature review. *International Journal of Environmental Research and Public Health*, 19(7), Article 3955. <https://doi.org/10.3390/ijerph19073955>
- Meutia, A. A., Bachriadi, D., & Gafur, N. A. (2023). Environment degradation, health threats, and legality at the artisanal small-scale gold mining sites in Indonesia. *International Journal of Environmental Research and Public Health*, 20(18), Article 6774. <https://doi.org/10.3390/ijerph20186774>
- Nuryanty, C. D., Riani, E., Abidin, Z., Sutjahjo, S. H., & Riyadi, A. (2024). Mercury contamination from artisanal small-scale gold mining activities in Simpenan District, Sukabumi Regency, West Java, Indonesia. *Asian Journal of Water, Environment and Pollution*, 21(4), 83–89. <https://doi.org/10.3233/AJW240049>
- Rahayu, D. P., & Faisal. (2021). Politik hukum kewenangan perizinan pertambangan pasca perubahan Undang-Undang Minerba. *Jurnal Pandecta*, 16(1), 170–182.
- Rahayu, S., & Yetniwati, Y. (2021). Tanggung jawab sosial perusahaan pertambangan batubara melalui program pengembangan dan pemberdayaan masyarakat. *Zaaken: Journal of Civil and Business Law*, 2(2), 221–230. <https://doi.org/10.22437/zaaken.v2i2.12274>
- Rayhan. (2023). Implementasi terhadap Minamata Convention on Mercury di Indonesia (studi kasus mengenai pencemaran merkuri dan arsen di Teluk Buyat). *Tirtayasa Journal of International Law*, 2(1), 68–80. <https://doi.org/10.51825/tjil.v2i1.19111>
- Sari, W. P., & Mubarak, A. (2020). Efektivitas penertiban penambangan emas ilegal di Kabupaten Dharmasraya. *Jurnal Manajemen dan Ilmu Administrasi Publik*, 2(2), 62–69. <https://doi.org/10.24036/jmiap.v2i2.129>
- Suryanto, M. H., Arresti, F. T., & Makky, A. (2024). No viral no justice: Perspektif teori efektivitas hukum Soerjono Soekanto. *Widya Yuridika: Jurnal Hukum*, 7(3), 513–522. <https://doi.org/10.31328/wy.v7i3.5076>
- Tomiyasu, T., Hamada, Y. K., Kodamatani, H., Hidayati, N., & Rahajoe, J. S. (2019). Transport of mercury species by river from artisanal and small-scale gold mining in West Java, Indonesia. *Environmental Science and Pollution Research*, 26, 25262–25274.
- Tomiyasu, T., Hamada, Y. K., Bransono, C., Kodamatani, H., Matsuyama, A., Imura, R., Hidayati, N., & Rahajoe, J. S. (2020). Mercury concentrations in paddy field soil and

- freshwater snails around a small-scale gold mining area, West Java, Indonesia. *Toxicology and Environmental Health Sciences*, 12, 23–29.
- Utami, N. E. (2023). Sentralisasi terhadap kewenangan pemerintah daerah dalam perizinan tambang pasca pemberlakuan Undang-Undang Mineral dan Batubara. *Lex Renaissance*, 8(2), 360–378.