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Cultured Mining Governance in the Perspective of *Siyasah Dusturiyah*: Evidence from Sand Mining in Boyolali Regency

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Abstract: Mining activities in Boyolali Regency provide economic benefits but also generate socio-environmental and governance challenges. This study examines sand and rock mining governance through the perspective of Siyasah Dusturiyah and proposes a governance model based on prophetic values. Using a socio-legal approach, the study analyzes mining practices in Cepogo, Musuk, and Selo District through field findings, legal analysis, and environmental data. The findings demonstrate that mining governance problems extend beyond licensing compliance. In Cepogo, mining supports local livelihoods while generating externalities affecting water, roads, air quality, noise and slope stability. In Musuk, problems involve spatial discrepancies, environmental documentation, and inadequate public participation. In Selo, hydrological risks and inadequate post-mining management indicate the ecological consequences of extraction. From the perspective of *Siyasah Dusturiyah*, mining authority constitute an amanah that must be directed toward maslahah and justice (*'adl*), while Sadd al-Dhari'ah provides a preventive principle for avoiding foreseeable harm. Based on these findings, this study proposes Cultured Mining, an integrated governance model combining legal, ecological, participatory, economic, and prophetic cultures through preventive licensing, responsible extraction, partivipatory monitoring, and restoration-oriented post-mining evaluation. The model offers a framework for transforming mining governance from permit-centered extraction toward socially responsible and ecologically sustainable resource management.

Keywords: Cultured Mining, Siyasah Dusturiyah, Mining Governance, Prophetic Values, Sadd Al-Dhari'ah

INTRODUCTION

Environmental permits in Indonesia are a complex issue along with the increasing need for economic development and are a pressure on environmental sustainability, especially in the

regions (Fadillah, 2022) Boyolali Regency, as one of the areas with considerable natural resource potential, faces quite serious problems in environmental management (Widodo & Hastuti, 2019) One of the most prominent issues is the rampant activity of group C mining, which is mining materials for industrial needs or that are not considered to directly affect the lives of many people (Cerya & Khaidir, 2021) On the one hand, this sector contributes to regional economic growth and creates jobs. However, on the other hand, uncontrolled mining practices cause environmental damage, such as land degradation, road damage, social conflicts, and threats to public health (Febrianto, 2024).

Data collected on the official website of the Central Statistics Agency (BPS) of Boyolali Regency, one of the group C excavated mines is located in Sumbung Village, Cepogo District. The mine is one of 8 (eight) locations issued by the Mining Business Permit (IUP). In general, the area of mining areas in various areas in Boyolali Regency includes 72.61 ha of seeded land and 5.04 ha of andesite, which employ more than 80 people and contribute 3.57% of gross regional domestic product (Badan Pusat Statistik Kabupaten Boyolali, 2024) These statistics show that although not the main sector, group C quarrying mines are one of the pillars of the economy of Boyolali Regency. However, it is not a justification for the large-scale exploitation of nature in the ecosystem.

When viewed from a positive legal aspect, mining licensing and other business activities are regulated through Law Number 3 of 2020 concerning Amendments to Law Number 4 of 2009 concerning Mineral and Coal Mining, as well as the *Online Single Submission* (OSS) mechanism designed to facilitate bureaucracy in investment activities(Fasyehhudin et al., 2022). However, the implementation of this ease of licensing is often not balanced with strict supervision and adequate environmental analysis. As a result, the legality procedures carried out can actually open the door to ecological (*mafsadah*) (Munib et al., 2022) In this context, there is a tension between the legal-formal aspect and the principle of sustainability, which is a basic need of society (Massiri et al., 2019).

At the regional level, Boyolali Regency has Regional Regulation (Perda) Number 10 of 2011 concerning Non-Metallic Mineral Mining and Rocks which is the source of reference for the issuance of IUP in Boyolali Regency. However, the reality shows that there are still many illegal mining actions that do not have an IUP (Samad et al., 2021) This shows the weak supervision of group C excavation mining in the Boyolali Regency area. One of the group C excavation mining locations is in Sumbung Village, Cepogo District, Boyolali Regency. Some miners without IUPs are free to mine, but these mining actions cause damage to the ecosystem and have a bad impact on the surrounding community (Samad et al., 2021).

When studied through the perspective of Islamic law, or also known as prophetic terms, *especially Siyasah Dusturiyah* emphasizes the principles of justice, order, and the benefit of the ummah in the administration of government(Amin & Arif, 2025) The manifestation of the prophetic approach that prioritizes the integration of Islamic values into science is by exploring the postulates *of naqli* in the Qur'an and Hadith (Hashim et al., 2018) In this case, mining permits are not just an administrative instrument, but a form of state responsibility in maintaining the mandate of Allah Subhanahu wa ta'ala over natural resources (*Al-Amanat Al-Mas'uliyyah*) so that they are not misused and continue to provide benefits to the community in general(Shuhari et al., 2019) In addition, the principle *of Sadd Adz-Dzari'ah* (closing the path to damage) is also relevant, because uncontrolled mining activities can cause great *mudharat* (losses) to the environment and future generations (Salman & Asmanto, 2024).

Based on these conditions, **there are two problems** can be formulated from this study: How is the governance of mining licensing C in Boyolali Regency reviewed from the perspective of *Siyasah Dusturiyah*?; and How is the offer of the concept of cultured mining for environmental sustainability in the *Sadd Adz-Dzari'ah-based Sadd Adz-Dzari'ah* quarrying mining concept?

Problem solving is carried out with a socio-legal approach, namely by identifying the facts that occur in the field, then formulating regulations resulting from synchronization between primary and secondary legal materials (Farid et al., 2025) The results of the observation of legal facts and the synchronization of laws and regulations are analyzed through the perspective *of Siyasah Dusturiyah*, then formulate the legal principles *of Sadd Adz-Dzari'ah* that direct the prevention of broader ecological *mafsadah* (damage).

Many studies on mining licensing in Indonesia have been carried out, both from the aspects of state administrative law, environmental law, and socio-economic studies. Several similar studies have been conducted by Nurwanti & Irawati (2022) which examined the model of environmental dispute resolution over the mining permit for excavation C in Cepogo Village, Cepogo District, Boyolali Regency through the *Alternative Dispute Resolution* (ADR) mechanism. The research focuses on non-litigation dispute resolution as a means of meeting community demands for environmental damage (Nurwanti & Irawati, 2020).

In another study conducted by Muflikhuddin, et al. (2019) examined the sociological aspects of the implementation of Regional Regulation Number 10 of 2011 concerning Non-Metallic Mineral Mining and Rocks. The research raised the issue of illegal mining managed by individuals for generations, while the Boyolali Regency Government has not carried out planning and lack of supervision of illegal miners. However, repressive problem solving has not been able to suppress illegal mining activities (Muflikhuddin As Syihab, Suteki, 2019).

Research gaps between several studies show that weak supervision and overlapping regulations are the main causes of the rise of illegal mining and environmental damage. However, most studies still focus on a purely positive legal framework. Problem solving should not only focus on handling cases after illegal mining events occur, but also the need to prevent environmental damage caused by group C mining (Sudarwanto & Kharisma, 2020).

The novelty of this research lies in the effort to review the licensing of excavation C mining using the *perspective of Siyasah Dusturiyah*. This approach emphasizes the value of justice, benefit, and order derived from sharia principles. Thus, this research not only offers a legal-administrative solution, but also provides a broader ethical-juridical foundation. This is important to encourage the emergence of a mining licensing governance model that is not only legally valid, but also cultural, in the sense that it is in harmony with moral, social, and religious values (Syafrini et al., 2022) In addition, the concept of cultured mining is directed at the concept of preventing environmental damage due to mining activities, as well as an environmental restoration system to re-conserve the impact on the surrounding community(Puspitaloka et al., 2020).

METHODS

This study is a type of socio-legal research, which is a combination of empirical (sociological) and normative (doctrinal) research (Fajar & Achmad, 2019) This approach was chosen because the issue of mining licensing C in Boyolali can not only be understood through a normative framework, but must also be related to the social reality in the field, including the implementation of rules, institutional dynamics, and the impact felt by the community. In a juridical context, this study examines laws and regulations related to mining licensing (such as Law Number 3 of 2020 concerning Amendments to Law Number 4 of 2009 concerning Mineral and Coal Mining, as well as Boyolali Regency Regional Regulation Number 10 of 2011 concerning Non-Metallic Mineral Mining and Rocks), as well as prophetic legal principles, especially the concepts of *Siyasah Dusturiyah* and *Sadd Adz-Dzari'ah*. Meanwhile, an empirical aspect is needed to understand the extent to which the permits are implemented, the implementation challenges faced, and the views of stakeholders in the region in their contribution to environmental conservation(Enggarani et al., 2025).

This study was determined in Boyolali Regency, Central Java, especially Cepogo, Musuk, and Selo District, Boyolali Regency because this area has a fairly high intensity of C mining activities and often causes problems related to the environment and the governance of its permits. The selection of this location also considers its relevance to local government policies and the needs of the local community for sustainable management of natural resources(Nuria Siswi & Farid, 2024).

The types of data in this study are divided into two, namely primary data and secondary data. Primary data was obtained through in-depth interviews with related parties, including officials of Boyolali Regency, Branch of the Energy and Mineral Resources Office (ESDM) of the Merapi Region, which is under the Energy and Mineral Resources Agency of Central Jawa, mining entrepreneurs, and representatives of communities affected by mining activities. In addition to interviews, primary data was also strengthened by field observations at several points of the mine location to obtain a real picture of environmental conditions and permit implementation. Meanwhile, secondary data includes laws and regulations, legal doctrines, academic literature, scientific journals, and fatwas or opinions of scholars relevant to the study of *siyasah*.

Data collection techniques were carried out by literature study, documentation, observation, and semi-structured interviews(Wardiono et al., 2023). Literature studies are used to explore positive legal norms and *siyasah* principles. Documentation is used to collect administrative data, such as mining permits issued by local governments. Observations are used to record the factual conditions of the environment. The semi-structured interviews were chosen in order to dig deeper information but still be directed in accordance with the focus of the research(Rani & Khotimah, 2021).

Data is analyzed qualitatively in several stages. First, the secondary data is analyzed using deductive methods to find relevant legal norms and *siyasah* principles. Second, primary data is processed through a process of reduction, categorization, and interpretation to find implementation patterns and constraints in the field. Third, an integration between juridical and empirical analysis is carried out by comparing *"das sollen"* (what should be according to the law and *siyasah*) with *"das sein"* (reality on the field). Based on this integration, a comprehensive picture of the gap between norms and practices will be obtained, as well as *siyasah*-based recommendations to improve the governance of mining licensing in Boyolali Regency(Pisestiyani et al., 2020).

RESULTS AND DISCUSSION

Empirical Profile of Sand and Rock Mining in Boyolali Regency

Mining activities in Boyolali Regency constitute an important part of local economic landscape, particularly in areas located on the slopes of Mount Merapi and Mount Merbabu. Sand and rock materials are utilized as construction materials and therefore have economic value for both mining operators and surrounding communities. Nevertheless, the empirical evidence indicates that the economic function of mining is accompanied by environmental and social externalities that have emerged in different forms across mining areas.

This study focuses on three districts Cepogo, Musuk, and Selo to illustrate the empirical complexity of mining governance in Boyolali. The three locations were not selected because they represented identical mining conditions. Rather, they provided complimentary evidence concerning three interconnected dimensions: socioeconomic dependence on mining, regulatory and participatory problems, and measurable ecological degradation(Asekomeh et al., 2021).

The empirical evidence used in this study was obtained through data triangulation. First, field findings from Sumbung Village, Cepogo District, are derived from a field study concerning communities affected by sand mining. Second, evidence from Keposong Village,

Musuk District, is drawn from an empirical legal study published in 2024. Third, quantitative environmental evidence from Selo District is obtained from studies at Apu River concerning the hydrological consequences of post-mining conditions. Historical evidence concerning mining activities in Selo is also used selectively to provide temporal context. The different sources are therefore not treated as interchangeable datasets but as complementary forms of evidence. The combination of these three sources enables the mining governance problem to be examined not merely from the perspective of licensing compliance, but also from its social, institutional, and ecological consequences(Nurhayati et al., 2025).

Data Obtained from Cepogo District

The case of Sumbung Village, demonstrates the socio-economic importance of mining activities for local communities. A 2025 field study identified approximately 250 active miners, with around 64% reportedly originating from the local community. This finding is important, because it indicates that mining is not merely an external economic activity conducted by outside investors. It has become partially integrated into the livelihood structure of the local population(Lestari & Farid, 2025).

This socio-economic dimension is also reflected in the historical development of mining activities. The existence of local workers means that restrictive mining policies may directly affect household income and employment. Consequently, the governance problem cannot be reduced to a binary choice between permitting and prohibiting mining. A more sophisticated approach is required to reconcile economic livelihoods with environmental protection. At the same time, the spatial relationship between mining areas and residential environments demonstrates the potential for significant externalities. The field study reported that mining locations were approximately 500 meters from residential areas and approximately one kilometer from public facilities. Mining transportation also utilized village roads as access routes. The relatively close proximity between extraction activities and community facilities means that environmental impacts are not confined to the mining site itself(Lestari & Farid, 2025).

Residents reported several consequences, including water sources becoming turbid or contaminated, landslides around mining cliffs during heavy rainfall, dust generated by mining transportation, noise, and deterioration of village roads. These findings demonstrate that the externalities of mining are distributed across several dimensions of community life: water security, physical safety, mobility, environmental quality, and residential comfort. The case also demonstrates that environmental management has not been completely absent. The field study identified replanting and land rehabilitation activities, with an estimated 70% reclamation success rate. However, this finding should not be interpreted as evidence that the environmental problem has been fully resolved. Reclamation is a post-extraction measure, whereas effective encironmental governance requires preventive controls from the licensing and operational stages. Thus, the Cepogo case demonstrates a central tension in mining governance: mining provides livelihoods while simultaneously generating environmental costs that may be distributed beyond those who directly benefit from the activity(Lestari & Farid, 2025).

Musuk: Spatial, Licensing, and Public Participation Problems

The situation in Musuk provides a different dimension of the mining governance problem. Research concerning rock mining in Keposong Village, Musuk District, published in *Jurnal Pro Natura* in 2024, found that the preparation of the environmental management document in the form of UKL-UPL was not implemented in accordance with applicable legal requirements. The study further found that the mining location was outside the coordinates of the Mining Business License Area (WIUP). The problem is therefore not limited to

environmental consequences after mining begins. It also concerns the quality of governmental decision-making before and during the authorization process(Febrianto, 2024).

The Keposong study further identified inadequate public participation in the preparation of environmental documents and environmental approval. This is particularly significant from a governance perspective because communities surrounding mining sites are not merely passive recipients of environmental impacts. They possess interests and knowledge concerning local environmental conditions, land use, water recources, agricultural activities, and infrastructure. The research also documented consequences experienced by surrounding communities, including road damage, landslides affecting agricultural land, and changes in water conditions. The environmental consequences were connected to changes in landform, erosion, and the potential reduction of water infiltration(Febrianto, 2024).

The temporal dimension of the Keposong case is equally significant. The study indicates that mining activities had already generated controversy for several years before the publication of the 2024 study. Consequently, the case illustrates that mining governance problems may persist when legal authorization, spatial planning, environmental documentation, and community participation are not integrated into a single governance framework. From the perspective of this study, Musuk therefore represents the governance dimension of the mining problem. Whereas Cepogo demonstrates the tension between livelihood and environmental externalities, Musuk demonstrates how weaknesses in spatial conformity, environmental documentation, and public participation can undermine the legitimacy of mining governance(Febrianto, 2024).

Selo: Quantitative Evidence of Ecological Degradation

The environmental condition in Selo provides important quantitative evidence concerning the hydrological consequences of sand mining. A study by Gunawan, et.al., published in the *Journal of Earth and Marine Technology* in 2024, examined the post-mining condition of the Apu River in Selo District, Boyolali Regency. The study was conducted along approximately 1 km of the Apu River, using five sampling stations distributed from downstream to upstream. The researchers observed irregular river channels and holes left in former mining areas without adequate restoration measures. The Apu River itself is identified as one of the relatively large centers of Merapi sand mining, and mining activities in the area have the potential to alter river flow patterns and increase the risk of overflow(Gunawan et al., 2024).

The quantitative measurements were conducted at five sampling stations. The study found that the maximum river-flow velocity was 0.57 m/s, while the minimum was approximately 0.40 m/s. The five stations also demonstrated differences in river width, ranging from approximately 1.61 meters at Station 5 to 4.10 meters at Station 1, indicating considerable variation in the river cross section along the investigated area. More importantly, the study identified a substantial difference between measured river discharge and the discharge projected through rainfall and runoff analysis. The researchers calculated a maximum runoff discharge of 2.77 m^3/s, based on a catchment area of 4.56 km^2, a rainfall intensity of 2.43 mm/hour, and a runoff coefficient of 0.9. The high runoff coefficient was associated with a catchment condition characterized by the absence of vegetation(Gunawan et al., 2024).

This finding is particularly relevant to the environmental governance of mining, because it demonstrates how land-cover conditions in a mining area influence hydrological responses. In a mining landscape where vegetation has been reduced and river channels have been physically altered, such conditions increase the potential for water to accumulate rapidly and exceed the capacity of existing river channels. Field measurements recorded a maximum river discharge of approximately 0.57m/s, whereas the calculated runoff discharge reached

2.77 m^3/s. The difference indicates that the river system required post-mining intervention to reduce the risk overflow(Gunawan et al., 2024).

The HEC-RAS modelling conducted by the researchers provides additional evidence of this condition. Before normalization, flooding occurred along substantial portions of the riverbank because the water elevation exceeded the existing embankment elevation at several stations. Following normalization, the model produced a flood elevation of 0.87 m, while the redesigned left and right embankments were elevated to 1.95 m. According to the model, the redesigned cross-section prevented overflow at the five observation stations(Gunawan et al., 2024).

The significance of these findings lies in the fact that the environmental consequences of mining in Selo can be demonstrated through measurable hydrological parameters rather than merely through anecdotal accounts. The Apu River study establishes a quantitative relationship between post-mining land conditions, surface runoff, river capacity, and flooding risk. It therefore strengthens the argument that mining governance must incorporate environmental carrying capacity and post-mining restoration into the regulatory process(Gunawan et al., 2024).

The Selo case consequently represents the ecological and hydrological dimension of the mining governance problem in Boyolali. While Cepogo demonstrates the socioeconomic dependence and direct environmental externalities of mining, and Musuk demonstrates problems concerning spatial conformity, licensing, environmental documentation, and public participation, Selo demonstrates how mining-related landscape alteration can translate into measurable hydrological risks.

Data Triangulation: Three Dimensions of the Mining Governance Problem

The empirical evidence from Cepogo, Musuk, and Selo reveals a consistent but multidimensional pattern. The evidence can be summarized as follows.

Table 1. Data Triangulation of Sand Mining Locations

Location	Empirical evidence	Principal problem
Sumbung, Cepogo	±250 active miners; ±64% local; mining approximately 500 m from settlements; reported water, road, dust, noise, and landslide impacts	Socio-economic dependence and environmental externalities
Keposong, Musuk	Mining outside WIUP coordinates; UKL-UPL and public participation problems; reported impacts on roads, agricultural land, and water	Spatial, licensing, and participatory governance
Apu River, Selo	±1 km study area; 5 sampling stations; maximum measured flow velocity 0.57 m/s; calculated runoff discharge 2.77 m^3/s; catchment area 4.56 km^2; runoff coefficient 0.9	Hydrological degradation and post-mining restoration

These data obtained from various source

The triangulation demonstrates three interconnected dimensions of mining governance. **First**, the Cepogo evidence demonstrates the socio-economic dimension, in which mining becomes a source of livelihood while simultaneously producing environmental externalities for surrounding communities. The approximately 250 active miners and the predominance of local workers illustrate the economic significance of the activity, while complaints concerning water, roads, dust, noise, and landslides illustrate the costs that may be borne by the community.

Second, the Musuk evidence demonstrates the legal-institutional dimension. The discrepancy between the authorized mining area and the actual location, together with weaknesses in environmental documentation and public participation, indicates that the existence of a licensing framework does not automatically guarantee substantive compliance.

Mining governance therefore requires coordination between licensing, spatial planning, environmental protection, and participatory mechanisms.

Third, the Selo evidence demonstrates the ecological-hydrological dimension. The five-station investigation of the Apu River found a maximum flow velocity of approximately 0.57 m/s, while hydrological calculations produced a maximum runoff discharge of approximately 2.77 m^3/s from a 4.56 km^2 catchment area with a runoff coefficient of 0.9. The HEC-RAS modelling further showed that the existing river condition could produce overflow and that normalization was necessary to restore hydraulic capacity.

The convergence of these findings indicates that the mining governance problem in Boyolali is simultaneously legal, administrative, socio-economic, and ecological. The three cases also show why a purely licensing-oriented approach is insufficient. A permit may regulate whether mining is legally authorized, but effective governance must additionally ensure spatial conformity, environmental safeguards, meaningful public participation, continuous supervision, and post-mining restoration(Ranjani & Hendi Setiawan, 2024). The triangulation also demonstrates that the environmental consequences of mining occur along a continuum(Roux, 2018). In Cepogo, residents experience environmental externalities in their everyday lives. In Musuk, environmental concerns intersect with spatial and administrative legality. In Selo, the consequences become measurable through hydrological indicators. These findings collectively demonstrate that environmental governance must begin before extraction, continue throughout mining operations, and extend into post-mining restoration.

Mining Governance in the Perspective of *Siyasah Dusturiyah*

The empirical findings demonstrate a gap between the normative aspiration of mining regulation and its implementation. Indonesian law establishes licensing, spatial planning, environmental approval, supervision, and reclamation as instruments for controlling mining activities. Yet the cases examined in this study show that formal regulatory instruments do not automatically produce responsible governance. This gap can be examined through *Siyasah Dusturiyah*, which conceptualizes governmental authority as an instrument for organizing public affairs in accordance with justice, responsibility, and public welfare(Trinanda et al., 2022).

The **first** principle is *amanah*. Governmental authority over natural resources constitutes a responsibility rather than an unrestricted discretionary power. In the context of mining, this means that licensing authorities must ensure that exploitation does not undermine the public interest. The Keposong case illustrates the relevance of this principle. The finding that the mining location was outside the relevant WIUP coordinates and that environmental documentation did not comply fully with applicable requirements demonstrates that the existence of formal administrative procedures does not necessarily guarantee substantive legality(Sheehy, 2019). From the perspective of *amanah*, the responsibility of government therefore extends beyond issuing license. It includes verifying spatial conformity, ensuring the quality of environmental documents, facilitating meaningful public participation, and supervising actual mining operations(Madjid, 2018). Government responsibility must consequently be understood as a life-cycle responsibility: licensing → operation → monitoring → reclamation → post-mining evaluation. Such an approach is more consistent with the concept of public trusteeship than a permit-centered administrative model.

The **second** principle is *maslahah*. Mining may produce substantial benefits by providing cinstruction materials, employment, and income. The evidence from Sumbung demonstrates this socio-economic function, with approximately 250 active miners and 64% reportedly originating from the local population. However, *maslahah* cannot be measured solely by the benefits obtained by miners and operators. A policy becomes problematic when economic benefits are concentrated among particular actors while environmental costs are

distributed to the wider community(Khan & Haneef, 2022). Water contamination, road damage, dust, noise, erosion, and landslide risks are examples of costs that may be borne by people who do not receive proportional economic benefits. Therefore, the relevant issue is not: "does mining generate economic benefit?", but rather: "does the overall governance arrangement produce greater public benefit than harm?". This distinction is central to the construction of Cultured Mining(Syafrini et al., 2022).

The **third** principle is justice (*'adl*). Justice in mining governance requires a fair distribution of both benefits and environmental burdens. The Selo erosion evidence is particularly relevant. When 19 of 26 land units are classified as having very heavy erosion hazards, the ecological burden cannot simply be regarded as a private consequence of mining operations. Likewise, the proximity of mining sites to settlements in Sumbung demonstrates that environmental risks may directly affect communities outside the mining operation. From a justice perspective, therefore, communities must have meaningful opportunities to paarticipate in decisions concerning mining activities that affect their environment(Serhan Ahmed, 2025). The findings from Keposong that public participation was not adequately implemented demonstrate the importance of this dimension.

Sadd al-Dhari'ah as a Preventive Principle of Mining Governance

While siyasah dusturiyah provides the principal framework for examining governmental governance, *Sadd al-Dhari'ah* provides a complementary preventive principle. *Sadd al-Dhari'ah* is relevant because environmental damage frequently becomes difficult or costly to reverse once it has occured. This principle lies in its orientation toward preventing means that may lead to greater harm(Hidayat, 2023). Consequently, governance should identify and restrict pathways that have a reasonable potential to produce *mafsadah* before irreversible damage occurs. The empirical evidence strongly supports this preventive orientation(Munib et al., 2022). In Cepogo, the proximity of mining activities to settlements and public facilities means that potential environmental and social risks can be identified at the planning stage. In Musuk, the problem of mining locations outside WIUP coordinates demonstrates that spatial verification should operate as an initial preventive filter rather than as a procedural formality. In Selo, the alteration of river channels and the absence of adequate post-mining restoration demonstrate the need to anticipate hydrological risks before environmental damage becomes more difficult and costly to reverse.

Accordingly, a preventive mining governance system should incorporate spatial screening, environmental risk assessment, meaningful public participation, continuous monitoring, corrective measures, and post-mining restoration. Such mechanisms operationalize *Sadd al Dhari'ah* by preventing foreseeable *mafsadah* before it develops into wider ecological and social damage.

From Conventional Mining to Cultured Mining

The empirical findings indicate the need to move beyond a conventional understanding of mining governance. Cultured Mining is not simply mining that complies with technical standards or possesses a valid permit. It represents a governance model in which legal, ecological, social, economic, and ethical responsibilities are integrated into the entire mining process(Syafrini et al., 2022).

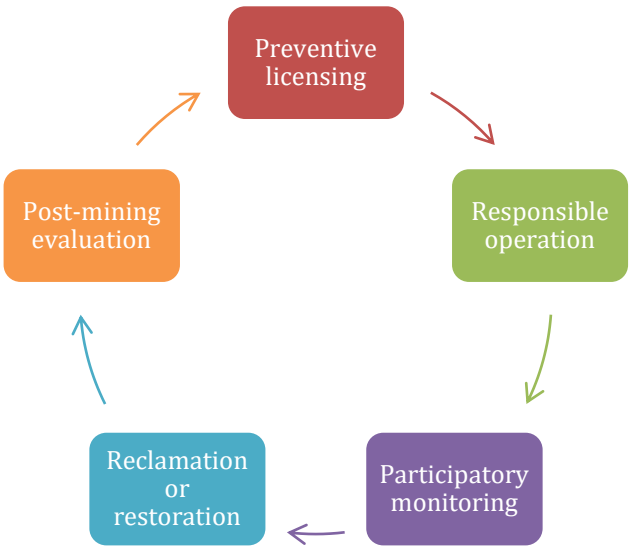
The concept consists of five interrelated dimensions. *First*, **Legal culture,** emphasizing compliance with licensing, spatial planning, environmental, and mining regulations; *second*, **Ecological culture,** emphasizing environmental carrying capacity, conservation, restoration, and prevention of ecological degradation; *third*, **Participatory culture,** emphasizing meaningful involvement of affected communities in decision-making and monitoring; *fourth*, Economic culture, emphasizing equitable distribution of economic benefits and the reduction

of excessive dependence on extractive activities; and *fifth*, **Prophetic culture**, emphasizing Islamic values such as *amanah*, *'adl*, *maslahah*, *islah*, and *Sadd al-Dhari'ah*.

These dimensions demonstrates that Cultured Mining is fundamentally concerned with transforming the culture of resource governance rather than merely improving administrative compliance.

Cultured Mining Governance Model

Based on the empirical findings, and the *Siyasah Dusturiyah* framework, Cultured Mining can be operationalized through four interconnected stages. First, **Preventive Licensing:** Licensing should begin with spatial screening, environmental risk assessment, and public participation. The objective is to ensure that mining is located in an appropriate area and that foreseeable environmental and social risks are identified before exploitation begins(Imamulhadi, 2021); second, **Responsible Extraction:** During mining operations, the operator must comply with environmental and technical requirements while maintaining the ecological and social functions of the surrounding area; third, **Participatory Monitoring:** Monitoring should involve government institutions, mining operators, and affected communities. Complaints and environmental changes should become part of a continuous monitoring mechanism rather than being addressed only after serious damage occurs; and fourth, **Restoration and *Maslahah* Evaluation:** Post-mining management must restore the ecological functions of the affected area. The Selo case demonstrates that restoration may require concrete interventions such as river normalization and restoration of vegetation. The final evaluation should determine whether the mining activity has produced a net public benefit or generated unacceptable social and ecological costs. Thus, the Cultured Mining governance cycle can be formulated as:



Source: Research analysis
Figure 1. Cultured Mining Governance Cycle

Synthesis of Findings

The findings provide several theoretical implications. First, *Siyasah Dusturiyah* can be employed not only to analyze constitutional authority in an abstract sense but also to examine the governance of natural resources and administrative decision-making. Second, *Sadd al-Dhari'ah* provides a preventive dimension that strengthens the capacity of *Siyasah Dusturiyah* to address foreseeable environmental harm. Third, prophetic values provide the ethical

orientation necessary to transform formal governance into substantively responsible governance(Absori & Nugroho, 2019).

The empirical and theoretical analysis produces four principal findings. First, the sand mining in Boyolali has an important socio-economic function, particularly for communities whose livelihoods are connected to mining activities. Second, the sand mining generates multidimensional externalities, including environmental, spatial, infrastructural, social, and hydrological cosequences. Third, institutional and regulatory weakness remain visible in the relationship between licensing, spatial conformity, environmental documentation, public participation, and supervision(Rani & Khotimah, 2021). Fourth, environmental consequences can be empirically observed through measurable hydrological conditions, as demonstrated by the Apu River study in Selo.

These findings demonstrate that mining governance cannot rely solely on the issuance of permits. Effective governance requires an integrated framework that combines preventive licensing, responsible extraction, public participation, continuous supervision, and post-mining restoration. Within the perspective of *Siyasah Dusturiyah*, such governance reflects the principles of amanah, maslahah, and justice, while *Sadd al-Dhari'ah* provides the preventive mechanism for avoiding foreseeable environmental and social harm. On this basis, Cultured Mining is proposed as a governance model that seeks to reconcile economic utilization of natural resources with ecological sustainability, community participation, legal responsibility, and prophetic ethical values(Farid et al., 2026).

CONCLUSION

This study demonstrates that sand and rock mining governance in Boyolali Regency cannot be adequately understood through licensing compliance alone. The empirical findings from Cepogo, Musuk, and Selo reveal interconnected socio-economic, legal-administrative, participatory, and ecological problems. In Cepogo, mining provides economic benefits while generating environmental externalities affecting water, roads, air quality, noise, and slope stability. In Musuk, governance weaknesses are reflected in spatial discrepancies, inadequate environmental documentation, and limited public participation. Meanwhile, the Selo case demonstrates hydrological risks associated with mining and inadequate post-mining management. From the perspective of *Siyasah Dusturiyah*, these findings affirm that governmental authority over natural resources constitutes an amanah that must be exercised for *maslahah* and justice (*'adl*). The principle of *Sadd al-Dhari'ah* complements this framework by emphasizing the prevention of foreseeable social and environmental harm before it becomes more extensive and difficult to reverse.

Based on these findings, this study proposes Cultured Mining as an integrated governance model that moves beyond permit-centered extractive practices by incorporating five dimensions: legal culture, ecological culture, participatory culture, economic culture, and prophetic culture. These dimensions are operationalized through a governance cycle of preventive licensing, responsible extraction, participatory monitoring, and restoration-oriented post-mining evaluation. The principal contribution of the study is therefore conceptual: Cultured Mining provides a framework for reconciling economic utilization of mineral resources with legal responsibility, ecological sustainability, community interests, and prophetic ethical values. In the context of Boyolali, this approach seeks to ensure that mining generates not only economic value but also broader public benefit (*maslahah*) while preventing foreseeable harm (*mafsadah*).

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