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Evaluation of Environmental Regulations in Reducing Natural Resource Degradation in Protected Forest Areas

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ABSTRACT

***Purpose**: This study examines the effectiveness of environmental regulations in reducing natural resource degradation in protected forest areas of South Sulawesi, Indonesia, focusing on governance challenges and implementation gaps.*

***Subjects and Methods:** A qualitative multiple-case study approach was employed, using data from 20 informants, policy documents, and field observations. The data were analyzed through thematic analysis supported by NVivo to identify key governance patterns.*

***Results:** The findings reveal that regulatory effectiveness is constrained by interconnected factors, including limited institutional capacity, governance fragmentation, reactive enforcement systems, socio-economic dependency on forest resources, and weak stakeholder coordination. These challenges demonstrate that environmental regulations function more as formal frameworks than as operational tools, reflecting a persistent policy–implementation gap. The discussion emphasizes the need for adaptive governance, stronger institutional capacity, integrated coordination mechanisms, and inclusive participation aligned with local socio-economic conditions.*

***Conclusions:** The study concludes that improving regulatory effectiveness requires shifting from rule-based approaches toward context-sensitive and collaborative governance models, while future research should expand comparative and interdisciplinary perspectives to strengthen environmental policy implementation.*

INTRODUCTION

According to Nurhidayah & Alam (2020) and Arifin & Nakagoshi (2011), Indonesia is a country with the highest biodiversity in the world; the large areas of forests are the ecological significance assets of the country and the world as well. Ola & Benjamin (2019), Under this endowment, the government establishes to be legally preserved some forests called as designated protected forests to protect hydrological systems, biodiversity as well as the soil stability. A range of guarded forest areas based in the territory of the Sulawesi a province which is located in the eastern part of the archipelago add to the ecological balance as well as the sustenance of local communities (Akhbar et al., 2024).

Such forest lands are however facing an increase in degradation due to illegal logging, land conversion and unsustainable harvest of forest products. To counter this loss, Indonesian government has enacted a series of environmental laws, these being Law No. 41/1999 on Forestry, Law No. 32/2009 on Environmental Protection and Management, and other ministerial pronouncements that focus on the areas of conservation and land-use regulation.

Such national frameworks are later multiplied with the inclusion of municipal and provincial ordinances, as well as regional forest management units (KPH) which attempt to enforce sustainable forest governance at a sub-national level (Kimengsi et al., 2023). However, even this large frame of regulation is irregularly enforced at best and often incapable of helping to conserve forest ecosystems against further degradation. This is a recurring theme in the literature wherein there is a persistent undoing between what is laid down in law and what is being done.

Surya et al. (2020) and Aslinda et al. (2024) said that, the implementation of environmental regulation in South Sulawesi is characterized by multifarious issues. The capacity of institutions is limited and overlapping jurisdiction between agencies continues to exist, there is insufficient funds to monitor the forests, and social-economic pressures that are imposed by community forces weaken the enforcement system (Schweizer et al., 2021).

In as much as decentralized governance seems to place decision-making near local circumstances, it has the potential to weaken regulatory integrity and responsibility. This lack is further worsened by insufficient representation of local and indigenous populations as the affected stakeholders with the most investments by the policy (Dawson et al., 2021).

The emphasis on finding solutions through empirical researches shows that there has been varying rates of ecological degradation within protected forests in the state of South Sulawesi, most notably in the Bantimurung-Bulusaraung National Park and the Karst Maros-Pangkep region despite the fact that they are considered to be under protective areas. Such threats as dried logging, limestone mining, or agricultural intrusion become yet unresolved, showing an inability to align the theories and the reality in terms of the policy development (Artiga, 2021).

Such results raise these questions about the effectiveness of regulations and regulation quality when it comes to the governance of the protected areas. Literature highlights that in order to minimize degradation of natural resources, resourceful governance, institutional tie-ups and neighborhood-based conservation practices play important roles (Gorowara et al., 2024). However, an increasing number of people are agreeing that top-down regulatory techniques will never be able to bring significant conservation results on their own. The regulatory frameworks in the context of South Sulawesi need to be evaluated both in the light of their legal validity and that of being able to fit local situations, reducing environmental harm, and encompassing the involved parties.

The environmental regulation in South Sulawesi is within a complex context, which entails multi-faceted active socio-economic dynamics. People around or inside forest areas that have been set aside automatically use these resources to meet their needs and many of the people do not have any other means to earn a living (Schroeder, 2021; Arba & Yuniansari, 2023; Trumpi, 2023; Kurniawan & Rahman, 2022).

These kinds of formation of hard measures will be resisted, uncooperative or even conflicts during times when there are no complimentary livelihood programs. Effectiveness of regulation therefore, has to be evaluated not only with ecological terms but also in terms of socio-political sustainability and to what extent the conservation objectives are in harmony with the local development interest.

The current research hence looks at the existing regulatory framework in South Sulawesi with special reference to its ability to prevent forest degradation in the coated areas. Amid increasing criticism of the need to conserve the environment and increasing burden on natural resource, particularly, in the context of biodiversity-rich areas, the goal is to clear up the real-world functioning of regulatory policies, through their administrative execution as well as the challenges faced by both of the regulatory bodies and the forest-relying communities.

Through a qualitative research methodology, the study aims at understanding the lived experiences of those actors who are direct participants or subjects of forest governance. By doing this, the research will be able to add to the development of the broader literature on environmental policy and forest governance in Indonesia shedding some light on the beauty and the beast of the local level regulatory mechanisms (Ogunkan, 2022). It is based on the fact that the reality-grounded evaluation of environmental regulations in the region of South Sulawesi can

provide important feedback into the means through which the given frameworks can become more practical, accommodating, and aligned with regional realities.

METHODOLOGY

Research Design

This study adopts a qualitative multiple-case study design to examine the effectiveness of environmental regulations in reducing natural resource degradation in protected forest areas of South Sulawesi. A qualitative approach was selected because it enables an in-depth exploration of governance processes, institutional dynamics, and socio-ecological interactions that cannot be adequately captured through quantitative methods. The case study design is analytically driven, where selected sites function as critical cases representing areas with both formal regulatory protection and ongoing environmental degradation. This allows the study to investigate the gap between regulatory frameworks and actual implementation, particularly in terms of enforcement capacity, institutional coordination, and community engagement.

Research Setting and Case Selection

The research was conducted in selected protected forest areas in South Sulawesi, including parts of Bantimurung–Bulusaraung National Park and the Maros–Pangkep karst landscape, which are known for their ecological importance and persistent degradation pressures. Sites were selected using purposive sampling based on two main criteria: (1) formal designation as protected forest areas under national and regional regulations, and (2) documented evidence of ongoing environmental degradation (e.g., illegal logging, land conversion, and mining activities). This selection strategy ensures that the cases are information-rich and analytically relevant for examining the effectiveness of environmental governance.

Data Sources and Collection Techniques

This study employed data triangulation by integrating three primary sources: interviews, document analysis, and field observations. First, semi-structured interviews were conducted with 20 key informants representing multiple stakeholder groups, including government officials (KPH and forestry agencies), local communities, NGOs, and village leaders. The interview guide was developed based on key analytical dimensions such as regulatory implementation, enforcement challenges, institutional coordination, and community participation. Interviews were conducted in Bahasa Indonesia, recorded with consent, and later transcribed for analysis. Second, document analysis was carried out on relevant policy documents, including forestry laws, regional regulations, management plans, environmental reports, and NGO publications. These documents were used to assess the formal regulatory framework and compare it with empirical findings from the field. Third, field observations were conducted to capture direct evidence of environmental conditions and governance practices, including illegal logging activities, land encroachment, and community interactions with forest resources. Observations also focused on identifying discrepancies between policy provisions and actual implementation. The integration of these three data sources enabled cross-validation of findings and strengthened the empirical basis of the analysis.

Data Analysis

The data were analyzed using a thematic analysis approach that integrates both inductive and deductive coding procedures. All interview transcripts, field notes, and policy documents were systematically organized and processed using NVivo software to enhance analytical rigor, transparency, and traceability of the coding process. NVivo was employed not as a quantitative analytical tool, but as a qualitative data management system that facilitates systematic coding, theme development, and cross-source comparison. The analysis proceeded in three stages. First, open coding was conducted to identify initial concepts emerging from the data, including enforcement limitations, institutional overlap, and livelihood dependency. Second, axial coding was used to group related codes into broader analytical categories such as institutional capacity, governance fragmentation, enforcement dynamics, socio-economic pressures, and stakeholder coordination. Third, selective coding was applied to synthesize these categories into overarching themes that explain the effectiveness of environmental regulations. While coding frequency was

observed during analysis, it was not used for statistical generalization. Instead, it served as a heuristic device to identify the relative prominence of themes within the dataset. The interpretation of findings was primarily grounded in meaning, context, and consistency across data sources, supported by triangulation between interviews, documents, and field observations.

Trustworthiness and Validation

To ensure the rigor of the study, several strategies were employed. Data triangulation was applied by comparing information across interviews, documents, and observations. Member checking was conducted with selected informants to validate interpretations and ensure alignment with participants' perspectives. An audit trail was maintained throughout the research process, documenting decisions related to data collection, coding, and analysis. This enhances transparency and allows for methodological traceability. In addition, the researcher applied reflexivity by critically reflecting on potential biases during data interpretation, particularly in relation to power dynamics among stakeholders.

RESULTS AND DISCUSSION

Overview of Thematic Findings

The thematic analysis reveals that the effectiveness of environmental regulations in protected forest areas is shaped by a set of interrelated governance challenges. Five major themes emerged from the data: institutional capacity constraints, governance fragmentation, enforcement dynamics, socio-economic pressures, and stakeholder coordination. These themes do not operate independently; rather, they interact in a mutually reinforcing manner, reflecting the complexity of environmental governance in South Sulawesi. Instead of indicating statistical distribution, the prominence of each theme reflects its analytical significance based on recurrence, depth of explanation, and consistency across multiple data sources.

Table 1. Thematic Structure and Analytical Prominence

Theme	Analytical Prominence	Cross-Source Validation	Key Insight
Institutional capacity	Very high	Strong	Capacity gaps limit implementation
Governance fragmentation	Very high	Strong	Overlapping authority weakens coordination
Enforcement dynamics	High	Strong	Enforcement is reactive and inconsistent
Socio-economic pressures	High	Strong	Livelihood dependency drives non-compliance
Stakeholder coordination	Moderate	Moderate–Strong	Participation remains superficial

Source: Thematic analysis using NVivo (2025)

The table illustrates that institutional and governance-related issues are the most analytically dominant themes, supported consistently across interviews, document analysis, and field observations. This indicates that regulatory challenges are deeply embedded in structural governance arrangements rather than merely technical or operational shortcomings.

Institutional Capacity Constraints

Institutional capacity constraints emerge as the most prominent theme influencing regulatory effectiveness. The findings consistently show that limitations in human resources, financial support, and technical expertise significantly hinder the ability of forest management institutions to perform their functions effectively. These constraints affect routine monitoring, enforcement operations, and responsiveness to environmental violations. Field observations confirm that several monitoring activities are irregular or absent, indicating a mismatch between regulatory expectations and operational realities. This suggests that regulatory effectiveness is contingent not only on the existence of formal rules but also on the institutional capacity to implement them.

> *"We face significant human resource constraints. The size of the forest area is disproportionate to the number of officers available in the field. In many cases, a single officer must oversee a vast area without adequate support. Furthermore, operational facilities such as vehicles and monitoring equipment are also very limited, preventing optimal oversight. This situation makes regulatory enforcement ineffective, even though the rules are clear."* (Participant 03, KPH Officer)

> *"The main problem is not the regulations themselves, but the capacity of the institutions implementing them. The available budget is very limited and often insufficient for routine patrols. We also face limitations in technical training, so many officers lack the competency to handle complex cases in the field. As a result, many violations go unaddressed."* (Participant 07, Forestry Agency Official)

The interview excerpts provide strong empirical grounding for the broader analytical claim that institutional capacity constraints are a fundamental barrier to regulatory effectiveness. The statements from both participants consistently highlight a structural imbalance between the scale of forest governance responsibilities and the resources available to implement them. This imbalance is reflected not only in the shortage of personnel, but also in the limited availability of operational infrastructure and technical competencies required to manage complex environmental challenges.

These narratives reinforce the interpretation that institutional limitations are systemic rather than incidental. The inability to conduct routine monitoring, respond promptly to violations, and maintain consistent enforcement reflects deeper organizational constraints embedded within the governance system. In this context, regulations function more as formal frameworks than as operational instruments, as their effectiveness depends heavily on the institutional capacity to translate them into practice.

The convergence between interview data and field observations strengthens the credibility of this finding, indicating that institutional weakness is consistently experienced across different governance levels. The participants' perspectives therefore substantiate the argument that improving environmental regulatory outcomes requires not only strengthening legal provisions but also investing in institutional capacity, particularly in terms of human resources, financial support, and technical capability.

Governance Fragmentation

Governance fragmentation is identified as a critical factor that weakens policy coherence and coordination. The data reveal that overlapping authority among institutions leads to ambiguity in roles and responsibilities, which in turn reduces the effectiveness of environmental regulation. Informants consistently described a lack of coordination between agencies operating at different administrative levels. Document analysis confirms that multiple regulatory frameworks coexist without clear integration, while field observations show inconsistencies in enforcement practices across jurisdictions.

Table 2. Patterns of Governance Fragmentation

Dimension	Observed Pattern	Implication
Institutional overlap	Multiple agencies involved	Role ambiguity
Coordination mechanisms	Weak or informal	Inefficiency
Vertical alignment	Inconsistent	Policy gaps
Enforcement consistency	Uneven across areas	Reduced credibility

Source: Triangulated qualitative data (2025)

> *"Overlapping authority among government institutions frequently occurs in forest governance. In practice, this creates confusion in the field regarding which agency is actually responsible for handling specific cases. In many situations, problems are not addressed promptly because each institution tends to wait for others to take action. Coordination between agencies is also very limited and often lacks a clear structure. As a result, existing policies are not well aligned, and their implementation becomes*

inconsistent across different areas. Ultimately, this situation reduces the effectiveness of environmental regulations in preventing forest degradation." (Participant 05, Local Government Officer).

The statement above illustrates how institutional overlap translates into operational ambiguity at the implementation level. The lack of clearly defined roles and structured coordination mechanisms leads to delays in decision-making and weakens accountability among responsible actors.

> *"There are many institutions involved in forest management, ranging from central government agencies to local authorities and technical units in the field. However, there is no strong and sustainable coordination mechanism that integrates their roles effectively. Each institution tends to operate based on its own mandate and priorities without sufficient alignment with others. This often results in policy conflicts and overlapping programs at the field level. In some cases, differences in institutional approaches even slow down decision-making processes. This condition shows that institutional fragmentation is one of the main factors behind weak regulatory implementation."* (Participant 09, NGO Representative)

These interview excerpts reinforce the broader finding that governance fragmentation is not merely an administrative issue but a structural challenge embedded in multi-level governance systems. Both participants highlight how overlapping authority and weak coordination mechanisms undermine policy coherence and enforcement consistency. These narratives substantiate the analytical argument that institutional fragmentation leads to role ambiguity, delayed responses, and ineffective regulatory outcomes, thereby weakening the overall capacity of environmental governance to address forest degradation.

Enforcement Dynamics

The findings indicate that enforcement practices are largely reactive and inconsistent. Rather than functioning as a preventive mechanism, enforcement tends to occur after environmental damage has already taken place. Informants also highlighted the influence of external pressures, including social and political considerations, which affect decision-making in enforcement processes.

Table 3. Characteristics of Enforcement Practices

Aspect	Observed Condition	Interpretation
Enforcement timing	Reactive	Low prevention capacity
Consistency	Variable	Weak deterrence
External influence	Present	Reduced autonomy
Monitoring intensity	Limited	Low coverage

Source: Thematic analysis and field observations (2025)

The patterns presented in Table 3 indicate that enforcement is structurally limited in its ability to function as an effective preventive mechanism. The predominance of reactive enforcement suggests that interventions are triggered by visible damage rather than guided by anticipatory monitoring systems. At the same time, the variability in enforcement consistency reduces the credibility of sanctions, weakening their deterrent effect. The presence of external influence further constrains institutional autonomy, while limited monitoring intensity reflects insufficient coverage across forest areas. Taken together, these conditions reveal that enforcement is not only operationally weak but also shaped by broader governance constraints that hinder its effectiveness.

> *"Law enforcement is usually carried out after the damage has already occurred, rather than as a preventive effort. In many cases, action is only taken when violations become clearly visible and have caused significant environmental impact. This means that early signs of illegal activities often go unnoticed or unaddressed. As a result, enforcement tends to be reactive instead of strategic. This condition reduces the ability of institutions*

to prevent further degradation, as responses are always delayed rather than proactive." (Participant 02, Field Officer)

The statement above reflects how enforcement practices are predominantly reactive, emphasizing the absence of early detection mechanisms and preventive strategies within the governance system.

> *"We often face situations where violations cannot be immediately addressed due to various considerations, including social and political pressures. In some cases, there are external influences that affect how decisions are made in the field. This creates hesitation in taking firm action, even when violations are evident. As a result, enforcement becomes inconsistent and less effective. Over time, this condition weakens the authority of regulations because offenders perceive that there are no serious consequences for their actions."* (Participant 11, Local Leader)

This perspective highlights how enforcement is not only limited by institutional capacity but also shaped by contextual pressures that interfere with decision-making processes. Interview excerpts reinforce the broader finding that enforcement systems lack strategic orientation and operate within constrained institutional environments. The experiences shared by participants illustrate how reactive enforcement, combined with external pressures and inconsistent application of sanctions, undermines the overall effectiveness of environmental regulation. These narratives therefore substantiate the argument that strengthening enforcement requires not only improved operational capacity but also greater institutional autonomy and a shift toward preventive governance approaches.

Socio-Economic Pressures

Socio-economic dependency on forest resources emerges as a key factor shaping environmental outcomes. The data show that local communities rely heavily on forest-based livelihoods, which creates tension between conservation policies and economic needs. In the absence of viable alternatives, communities continue to engage in activities that contribute to environmental degradation.

Table 4. Socio-Economic Context of Forest Use

Dimension	Observed Condition	Implication
Livelihood dependency	High	Persistent resource use
Economic alternatives	Limited	Low compliance
Poverty pressure	Significant	Increased exploitation
Policy alignment	Weak	Social resistance

Source: Interview data and field observations (2025)

The patterns presented in Table 4 indicate that socio-economic conditions play a decisive role in shaping community behavior toward forest resources. High dependency on forest-based livelihoods, combined with limited economic alternatives, creates structural pressure that drives continued resource use despite regulatory restrictions. The presence of poverty further intensifies this dynamic, as immediate survival needs often take precedence over long-term environmental considerations. In addition, weak alignment between policy objectives and local socio-economic realities contributes to resistance and low compliance, suggesting that regulatory approaches alone are insufficient without addressing underlying livelihood challenges.

> *"Most communities living near the forest depend heavily on forest resources for their daily needs. Without access to alternative sources of income, they have little choice but to continue utilizing these resources, even when it conflicts with existing regulations. This situation makes it difficult to enforce conservation policies effectively."* (Participant 14, Community Member)

This statement highlights how livelihood dependency directly influences compliance behavior, emphasizing that economic necessity often overrides regulatory considerations.

> *"Government programs often fail to take into account the economic conditions of local communities. When policies are implemented without providing viable alternatives, people tend to resist or ignore them. As a result, conservation efforts become less effective because they do not align with the realities faced by the community." (Participant 18, Village Leader)*

This perspective underscores the misalignment between policy design and local socio-economic conditions, which contributes to weak implementation outcomes.

> *"In many cases, people enter forest areas not because they want to violate the law, but because they need to survive. Agricultural expansion and small-scale resource extraction are often the only available options for generating income. Without support for alternative livelihoods, these practices are likely to continue."* (Participant 06, Community Member)

This view illustrates that environmental degradation is often driven by necessity rather than intent, reinforcing the importance of addressing structural economic factors.

> *"There is a gap between conservation policies and the actual needs of communities. Programs are often designed from a top-down perspective without sufficient understanding of local conditions. This creates a lack of trust and reduces community willingness to participate in conservation initiatives."* (Participant 10, NGO Representative)

This statement emphasizes how limited community inclusion in policy design weakens both trust and participation, further complicating implementation. Interview excerpts reinforce the broader finding that socio-economic pressures are deeply intertwined with environmental governance outcomes. The participants consistently highlight that livelihood dependency, lack of alternatives, and policy misalignment shape community behavior in ways that challenge regulatory effectiveness. These narratives substantiate the argument that environmental regulations cannot be effective in isolation, but must be complemented by inclusive and context-sensitive approaches that address the socio-economic realities of forest-dependent communities.

Stakeholder Coordination

Stakeholder coordination is found to be limited, particularly in terms of meaningful community participation. Although participatory approaches are formally recognized, their implementation remains largely procedural rather than substantive. Informants emphasized that community involvement is often restricted to consultation rather than active engagement in decision-making.

Table 5. Stakeholder Engagement Patterns

Dimension	Observed Condition	Implication
Participation type	Consultative	Low ownership
Collaboration level	Limited	Weak synergy
Institutional support	Inadequate	Poor sustainability
Community inclusion	Partial	Low compliance

Source: NVivo thematic analysis (2025)

The patterns presented in Table 5 indicate that stakeholder coordination is structurally weak and lacks depth in implementation. Participation tends to be symbolic rather than substantive, resulting in low levels of community ownership over conservation initiatives. Limited collaboration among stakeholders further reduces synergy in governance processes, while inadequate institutional support weakens the sustainability of participatory programs. The partial inclusion of communities also contributes to low compliance, as local actors do not perceive themselves as integral parts of the decision-making process.

> *"Community involvement is still very limited and often feels like a formality. We are usually invited to attend meetings, but not to actively contribute to decision-making. As a result, many policies do not reflect local realities and needs." (Participant 16, Community Member)*

This statement highlights how participation is largely procedural, emphasizing the gap between formal inclusion and meaningful engagement.

> *"The current form of participation does not yet reflect true collaboration. Many programs are designed without fully involving local communities, which makes implementation less effective. Without shared ownership, it is difficult to achieve long-term sustainability."* (Participant 08, NGO Representative)

This perspective underscores the importance of moving beyond consultation toward genuine collaborative governance.

> *"There is often a lack of communication between stakeholders, especially between government institutions and local communities. This creates misunderstandings and reduces trust, which ultimately affects the success of conservation programs."* (Participant 04, Local Community Leader)

This view illustrates how weak coordination contributes to trust deficits and hampers collective action.

> *"In many cases, community members are only informed about decisions that have already been made. They are not involved in the planning process, which makes them feel excluded and less motivated to comply with regulations."* (Participant 13, Community Member)

This statement emphasizes the consequences of top-down decision-making on community motivation and compliance.

> *"Effective coordination requires continuous engagement, not just one-time consultations. Without ongoing dialogue and support, participatory approaches remain superficial and fail to produce meaningful outcomes."* (Participant 10, NGO Representative)

This perspective highlights the need for sustained interaction and institutional commitment to strengthen participation. The interview excerpts collectively reveal a consistent pattern in which stakeholder participation is experienced as procedural rather than substantive. Across different participant groups, there is a shared perception that involvement is largely limited to formal consultation without meaningful influence on decision-making processes. This creates a disconnect between policy formulation and local realities, as communities are positioned as passive recipients rather than active contributors. As reflected in the statements of Participants 16 and 13, the lack of early-stage involvement in planning processes diminishes both relevance and acceptance of policies at the community level. The narratives highlight that weak coordination is closely linked to communication gaps and institutional fragmentation. Participants emphasize that insufficient interaction between stakeholders not only creates misunderstandings but also erodes trust, which is a critical component of collaborative governance. The perspectives of Participants 04 and 08 illustrate that the absence of integrated coordination mechanisms results in fragmented implementation, where different actors operate without shared direction. This condition ultimately weakens synergy and reduces the overall effectiveness of conservation programs. The findings indicate that the sustainability of participatory approaches depends on the continuity and depth of engagement. As noted by Participant 10, one-time consultations are insufficient to build genuine collaboration or long-term commitment. Instead, effective stakeholder coordination requires ongoing dialogue, institutional support, and inclusive governance structures that enable shared ownership. Taken together, these interview excerpts demonstrate that limited participation, weak communication, and lack of sustained engagement are interconnected challenges that reinforce each other, thereby constraining the effectiveness of environmental governance.

Discussion

Reassessing the Effectiveness of Environmental Regulations in Practice

The findings indicate that the effectiveness of environmental regulations in protected forest areas cannot be evaluated solely through the existence of legal frameworks (Das, 2024; Leal et al., 2018;

Uitto, 2019; Dawson et al., 2024). Although regulatory instruments are formally comprehensive, their practical impact remains limited due to challenges in implementation. This suggests that effectiveness should be understood as a function of how regulations operate in real-world contexts rather than how they are designed on paper. The study reveals a persistent discrepancy between regulatory intent and actual outcomes. Börner et al. (2020) and Soga & Gaston, (2018) Environmental policies aim to prevent degradation, yet empirical conditions show continued forest exploitation. This gap reflects the broader issue of implementation failure, where formal compliance does not necessarily translate into environmental sustainability.

The results further demonstrate that regulatory effectiveness is influenced by contextual factors, including institutional conditions and socio-economic dynamics. Regulations that do not account for local realities tend to encounter resistance or partial compliance (Taylor & van, 2019; Kjaer & Vetterlein, 2018). This highlights the importance of aligning policy objectives with the socio ecological context in which they are implemented. From a governance perspective, this condition aligns with the concept of the policy implementation gap. Regulations may be normatively strong but operationally weak, particularly when institutional capacity and coordination mechanisms are insufficient. As a result, policies function more as symbolic instruments rather than effective tools for environmental protection.

The study suggests that regulatory effectiveness should be evaluated beyond compliance indicators. Instead, it should consider outcomes such as behavioral change, reduced environmental pressure, and improved governance practices. This broader perspective allows for a more comprehensive understanding of policy performance. The findings also indicate that effectiveness is not a static condition but a dynamic process shaped by ongoing interactions between institutions, communities, and environmental conditions (Blanco et al., 2022; Soderstrom & Weber, 2020). This reinforces the need for flexible and adaptive regulatory approaches that can respond to changing contexts.

The lack of integration between policy design and implementation practices further weakens effectiveness. Policies are often developed at higher administrative levels without sufficient consideration of local operational constraints, resulting in limited applicability at the field level. The study therefore argues that improving regulatory effectiveness requires a shift from rule-based governance toward context-sensitive and adaptive approaches. This involves not only strengthening legal frameworks but also ensuring that they are practically implementable and socially acceptable. The effectiveness of environmental regulations is contingent upon the alignment between policy design, institutional capacity, and socio-economic realities. Without this alignment, regulatory interventions are unlikely to achieve their intended environmental outcomes.

Institutional Capacity and the Limits of Enforcement Systems

The findings highlight that enforcement capacity is a critical determinant of regulatory effectiveness. Enforcement systems in the studied areas are constrained by institutional limitations, which reduce their ability to function effectively. These limitations are not incidental but systemic, affecting multiple aspects of governance. One of the key issues identified is the imbalance between the scale of environmental responsibilities and the resources available to address them (Feng et al., 2023; Babapour Chafi et al., 2021; Agrawal et al., 2024). Forest areas are extensive, while the number of personnel and available infrastructure remains limited. This imbalance reduces the frequency and coverage of monitoring activities.

Enforcement practices tend to be reactive rather than preventive. Hersel et al. (2019) and Hino et al. (2018) said that, instead of identifying and addressing potential violations early, institutions respond only after environmental damage has occurred. This reactive approach reduces the overall effectiveness of enforcement mechanisms. From a theoretical perspective, this reflects the limitations of command-and-control approaches in complex environmental systems. Enforcement based solely on punitive measures is insufficient when monitoring capacity is weak and violations are difficult to detect.

The study finds that enforcement consistency is affected by both institutional and contextual factors. Variability in enforcement practices reduces the credibility of regulatory systems and

weakens their deterrent effect. When sanctions are applied inconsistently, compliance becomes less predictable. The influence of external pressures, including social and political considerations, further complicates enforcement processes (Aragòn-Correa et al., 2020). Decision-making is not always based on regulatory principles but is often shaped by situational factors. This reduces institutional autonomy and weakens enforcement outcomes.

The lack of technical capacity limits the ability of institutions to address complex environmental issues. Effective enforcement requires not only manpower but also specialized knowledge and tools, which are often insufficient. These findings suggest that enforcement systems are structurally constrained and require comprehensive reform. Improving enforcement capacity involves strengthening institutional resources, enhancing technical expertise, and developing more strategic approaches to monitoring and intervention. Enforcement effectiveness depends on the ability of institutions to operate proactively, consistently, and independently. Without these conditions, enforcement mechanisms will continue to have limited impact on environmental outcomes.

Institutional Fragmentation and Challenges of Multi-Level Coordination

The study reveals that institutional fragmentation is a major obstacle to effective environmental governance. According to Ouko et al. (2018), multiple agencies are involved in forest management, but their roles and responsibilities are not always clearly defined. This creates ambiguity and reduces coordination efficiency. Fragmentation is particularly evident in multi-level governance structures, where authority is distributed across national, regional, and local institutions. While decentralization is intended to enhance responsiveness, it often results in overlapping mandates and unclear accountability.

The lack of coordination mechanisms further exacerbates this issue. Institutions tend to operate independently rather than collaboratively, leading to fragmented implementation of policies. This reduces the overall coherence of governance processes. From a theoretical standpoint, these findings align with multi-level governance challenges, where coordination failures arise due to institutional complexity. Effective governance requires not only the presence of multiple actors but also the integration of their roles and actions (Koopmans et al., 2018; Bridoux & Stoelhorst, 2022).

The study also finds that fragmentation affects decision-making processes. Delays and inconsistencies occur when institutions are unable to coordinate effectively, reducing the timeliness and effectiveness of interventions. The absence of shared frameworks and communication channels limits information exchange among stakeholders. This further weakens coordination and reduces the ability to respond to environmental challenges in a unified manner.

Fragmentation also has implications for accountability. When responsibilities are unclear, it becomes difficult to assign responsibility for failures or successes in environmental management. This reduces institutional accountability and transparency. Addressing fragmentation requires strengthening coordination mechanisms, clarifying institutional roles, and promoting collaborative governance practices. This involves both vertical integration across governance levels and horizontal coordination among institutions. Effective environmental governance depends on the ability of institutions to operate as a coordinated system rather than as isolated entities. Without integration, fragmentation will continue to undermine regulatory effectiveness.

Community Engagement and Socio-Economic Dimensions of Environmental Governance

The findings emphasize that community engagement is a critical component of environmental governance, yet its current implementation remains limited (Ward et al., 2020; Bennett & Satterfield, 2018; Lihua et al., 2020). Participation is often formalistic, focusing on consultation rather than meaningful involvement in decision-making. This limited participation reduces community ownership of conservation initiatives. When communities are not actively involved, they are less likely to support or comply with regulatory measures. This weakens the effectiveness of governance interventions.

At the same time, socio-economic dependency on forest resources plays a significant role in shaping community behavior. Local populations rely on forests for their livelihoods, creating a tension between conservation objectives and economic needs (Carson et al., 2018; López-Carr, 2021). This tension highlights the limitations of regulatory approaches that do not address underlying socio-economic conditions. Policies that restrict resource use without providing alternatives are likely to face resistance and low compliance.

From a theoretical perspective, this reflects the principles of socio-ecological systems, where human and environmental dynamics are interconnected. Effective governance must therefore consider both ecological sustainability and social well-being. The study also indicates that participatory approaches are often implemented in a top-down manner. Communities are included in processes but not empowered to influence outcomes. This limits the effectiveness of participation as a governance tool.

The lack of continuous engagement reduces the sustainability of participatory initiatives. One-time consultations are insufficient to build trust and long-term collaboration. Effective participation requires ongoing interaction and institutional support. The findings suggest that improving community engagement requires a shift toward collaborative governance models (Clark, 2021; Ahmad & Esposito, 2025; Bianchi et al., 2021). These models emphasize shared decision-making, mutual trust, and long-term partnerships between stakeholders.

Environmental governance cannot succeed without integrating community perspectives and addressing socio-economic realities. Sustainable outcomes depend on the alignment between conservation goals and local livelihoods, supported by inclusive and participatory governance mechanisms.

CONCLUSION

This study demonstrates that the effectiveness of environmental regulations in reducing natural resource degradation in protected forest areas of South Sulawesi remains limited due to interconnected governance challenges. The findings reveal that institutional capacity constraints, governance fragmentation, weak enforcement systems, socio-economic pressures, and limited stakeholder coordination collectively undermine regulatory implementation, resulting in regulations functioning more as normative frameworks than as effective instruments of environmental protection. The study contributes to the literature by redefining regulatory effectiveness beyond formal compliance, emphasizing the importance of institutional capacity, multi-level coordination, and alignment with socio-ecological conditions. It highlights the need to shift enforcement approaches from reactive to preventive, strengthen institutional integration and accountability, and promote inclusive governance that accommodates local livelihood realities. From a practical perspective, improving environmental governance requires investments in institutional capacity, enhanced coordination mechanisms, and participatory models that foster meaningful stakeholder engagement. However, this study is limited to qualitative insights derived from selected cases, which may restrict broader generalization, and future research is recommended to incorporate comparative or mixed-method approaches to further examine regulatory effectiveness across diverse contexts.

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