

Synergy of Local Community and Government Policies in Preserving River Ecology: A Case Study on Illegal Gold Mining in Kuantan Tengah

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Abstrak

The Kuantan River in Kuantan Singingi Regency, Riau Province, has long served as a cultural and ecological lifeline for local communities. However, its sustainability is increasingly threatened by Penambangan Emas Tanpa Izin (illegal gold mining), which has caused severe water pollution, ecological degradation, and socio-economic conflicts. This study aims to analyze the roles of local government and communities in addressing river degradation, and to examine how the integration of customary (adat) law and environmental law may contribute to sustainable river governance. A qualitative case study design was applied, utilizing interviews, field observations, and document analysis to capture the dynamics of governance, community participation, and ecological impacts. The findings reveal that while the local government has introduced regulatory frameworks and monitoring programs, implementation remains weak due to limited resources and enforcement capacity. At the same time, local communities contribute significantly through grassroots initiatives such as collective clean-up activities, waste management, and cultural reinforcement via the Pacu Jalur festival, though these efforts are constrained by economic dependence on illegal mining. The study concludes that long-term sustainability requires synergy between government and community, supported by the integration of adat law's cultural legitimacy with the formal authority of environmental law. This hybrid framework enhances compliance, legitimacy, and resilience in preserving river ecology.

Keywords: River Conservation, Local Government, Community Participation, Adat Law, Environmental Law

1. Introduce

Rivers are among the most essential ecological systems supporting human life, providing clean water, food, transportation, cultural identity, and ecological balance [1]. Historically, rivers have shaped the development of civilizations, enabling agricultural systems, sustaining biodiversity, and fostering cultural heritage [2]. In the context of sustainable development, the management of rivers is inseparable from the broader goal of balancing economic growth, ecological preservation, and social welfare [3]. However, in many developing countries, this balance is increasingly disrupted by unregulated exploitation of natural resources. The Kuantan River in Riau Province, Indonesia, exemplifies this global challenge. Once the cultural and ecological lifeline of local communities, the river has suffered ecological degradation due to Penambangan Emas Tanpa Izin (PETI), or illegal gold mining, which threatens both environmental sustainability and community livelihoods.

The Kuantan River is not only a primary source of water and transportation for the people of Kuantan Singingi but also a cultural symbol, particularly through Pacu Jalur, a traditional boat race

recognized as a national cultural heritage. The river represents the identity of the local community and connects various villages along its course. However, recent years have witnessed alarming environmental degradation. The river water, once clear and consumable, has become turbid and polluted, endangering human health, agriculture, and aquatic biodiversity [4]. Similar cases have been reported in Bangladesh, India, and the Philippines, where unregulated gold mining and industrial waste significantly reduced water quality and public health outcomes [5]. These findings suggest that the Kuantan River is part of a broader regional and global crisis in river governance.

The issue of PETI in Kuantan Singingi highlights the tension between short-term economic benefits and long-term ecological sustainability. On the one hand, illegal mining provides immediate income and sustains local economies. On the other hand, it creates irreversible damage to ecosystems, weakens agricultural productivity, and increases health risks due to heavy metal contamination, particularly mercury [6] [7]. Such dynamics underscore the need for governance approaches that do not simply prioritize economic growth but also integrate environmental and social considerations.

Theoretically, this study adopts perspectives from human ecology and collaborative governance. Human ecology emphasizes the interdependence between humans and their natural environment, framing ecological degradation as a product of institutional weaknesses and unsustainable socio-economic practices [8]. Collaborative governance, in turn, stresses that sustainable management of common-pool resources such as rivers requires joint action among government institutions, local communities, and civil society [9]. Ostrom's (1990) work on governing the commons demonstrates that community trust, social norms, and institutional design significantly influence the success of environmental governance. In the Kuantan River context, these perspectives help explain why top-down regulation alone is insufficient and why indigenous values and community initiatives are critical for long-term sustainability.

Empirical evidence further supports this argument. Studies show that community-based initiatives—such as river cleaning, waste management, and cultural conservation activities—can enhance collective responsibility and environmental awareness [10]. In Indonesia, for instance, community-led *gotong royong* (mutual cooperation) activities have proven effective in raising awareness and improving water quality at the local level [11]. However, these grassroots efforts often face limitations when not supported by strong institutional frameworks. The World Bank [12] warns that without coherent governance structures, even well-intentioned local initiatives risk being overwhelmed by large-scale environmental pressures.

The role of government remains central. Local autonomy grants districts and provinces in Indonesia the authority to design and enforce environmental regulations. However, governance challenges persist, including weak law enforcement, lack of technical expertise, and inadequate coordination among agencies [13]. Similar challenges have been identified in the implementation of the European Union Water Framework Directive, where institutional misalignment hindered the achievement of ecological objectives [7]. Thus, the Kuantan River case underscores the need for stronger multi-level governance that integrates state authority with local knowledge and cultural practices.

At the same time, global studies emphasize that environmental degradation disproportionately affects vulnerable communities, undermining not only ecological resilience but also social equity [6] [14]. In this regard, the Kuantan River holds dual significance: it is both an ecological system in crisis and a cultural symbol that fosters community solidarity. The cultural dimension, particularly the Pacu Jalur festival, strengthens the legitimacy of

conservation efforts by connecting ecological preservation with local identity and traditions. This aligns with Ostrom's [15] assertion that institutions rooted in cultural norms are more likely to achieve long-term compliance and effectiveness.

Therefore, this research seeks to analyze how local government policies and community participation interact in addressing the ecological degradation of the Kuantan River caused by PETI. Specifically, the objectives are threefold: first, to identify the ecological and socio-cultural impacts of PETI on the Kuantan River; second, to evaluate the effectiveness of local government policies and institutional frameworks in mitigating environmental degradation; and third, to examine how indigenous practices and community-based initiatives contribute to sustainable river governance. By employing a qualitative case study design [16], this study provides a nuanced understanding of the socio-ecological dynamics at play.

The contribution of this research is both theoretical and practical. Theoretically, it enriches the discourse on human ecology and collaborative governance by situating these frameworks within the specific case of the Kuantan River. Practically, it offers evidence-based recommendations for policymakers, local governments, and civil society actors in Indonesia and beyond. As rivers worldwide face mounting pressures from illegal resource exploitation, pollution, and climate change, lessons from the Kuantan River experience may inform broader efforts toward sustainable and inclusive water governance.

2. Method

This study applied a **qualitative case study design** to explore how government policies and community participation interact in the management of the Kuantan River amid challenges posed by *Penambangan Emas Tanpa Izin* (PETI). The case study approach was considered appropriate because it allows an in-depth exploration of complex socio-ecological dynamics within their real-life context [16]. In addition, qualitative research provides flexibility for capturing diverse perspectives and uncovering nuanced interactions between ecological conditions, cultural practices, and governance arrangements [17].

Data sources were drawn from both primary and secondary materials. Primary data consisted of information collected from in-depth interviews, field observations, and participation in local cultural and environmental activities. Interviewees included government officials from the local environmental and mining agencies, community leaders, indigenous representatives, and residents directly affected by PETI. These participants were selected through

purposive sampling, ensuring that respondents were knowledgeable and directly involved in river governance [18]. Secondary data included local government reports, environmental policy documents, media coverage, and relevant academic studies concerning river conservation and illegal mining.

Data collection techniques employed in this research were designed to ensure comprehensive and reliable insights. Semi-structured interviews were conducted with 20 key informants. This format allowed the researchers to guide the discussion while giving respondents flexibility to elaborate on their experiences and perspectives [19]. Field observations were carried out along different sections of the Kuantan River to record visible ecological impacts such as sedimentation, water turbidity, and reduced biodiversity. Additionally, participation in community-based river cleaning events and the cultural festival *Pacu Jalur* provided first-hand understanding of the socio-cultural significance of the river. To complement these methods, document analysis was used to examine policy frameworks, legal regulations, and customary practices (*hukum adat*) relevant to environmental governance [20].

Data analysis followed a thematic approach, combining inductive and deductive strategies. All interview transcripts, observation notes, and documents were coded systematically to identify recurring patterns related to governance, ecological degradation, community participation, and indigenous knowledge. Inductive coding was used to allow themes to emerge from the data, while deductive coding was informed by existing theories such as human ecology [8] and collaborative governance [9]. This combination ensured that findings were grounded in empirical evidence while remaining connected to broader theoretical frameworks.

To enhance **research credibility and trustworthiness**, triangulation was applied by cross-checking findings from interviews, observations, and documents [21]. Member checking was conducted with selected participants to validate interpretations and ensure accuracy [22]. An audit trail documenting data collection and analysis processes was maintained to ensure transparency. Ethical considerations were prioritized throughout the research process, including obtaining informed consent, ensuring confidentiality, and respecting cultural values during fieldwork.

By integrating multiple data sources and methodological strategies, this research design provided a holistic understanding of the interplay between local government policies and community initiatives in the conservation of the Kuantan River.

This approach not only identified the ecological impacts of PETI but also captured the socio-cultural and institutional dimensions shaping river governance.

3. Results and Discussion

The Role of Local Government in Preserving the Ecology of the Kuantan River in Kuantan Singingi Regency

The findings of this study highlight that the **local government plays a central role** in addressing the ecological degradation of the Kuantan River caused by *Penambangan Emas Tanpa Izin* (PETI). As the authority mandated by Indonesia's decentralized governance system, the Kuantan Singingi Regency Government holds responsibility for designing, implementing, and enforcing environmental policies at the regional level. However, the research indicates that the government's role has been characterized by a mixture of **policy efforts, institutional weaknesses, and enforcement challenges**.

First, the local government has **introduced regulatory frameworks** aimed at mitigating the impacts of PETI, including the implementation of environmental monitoring programs and the issuance of local regulations on mining activities. Yet, these measures often remain ineffective due to limited institutional capacity and inadequate coordination among relevant agencies. Similar patterns are observed in other decentralized governance contexts, where local governments struggle to reconcile environmental protection with economic pressures [13]. This reflects what Moss [7] described as a problem of "spatial fit," in which governance structures are misaligned with ecological systems, resulting in fragmented management of river basins.

Second, **weak law enforcement** remains a critical obstacle. Although local authorities have the mandate to curb illegal mining, enforcement efforts are undermined by limited personnel, lack of technical resources, and, in some cases, political and economic interests that protect illegal operations. This is consistent with global findings that weak enforcement mechanisms are among the leading causes of ineffective river governance in developing countries [12] [1]. Without consistent monitoring and sanctioning, PETI activities continue to flourish, exacerbating ecological damage.

Third, the findings show that the **government's role cannot be separated from its relationship with local communities**. Policies that are developed in a top-down manner often fail to gain legitimacy among residents, particularly when they conflict with local economic interests. For example, prohibiting PETI without providing alternative livelihoods creates resistance and reduces

compliance. This aligns with Ostrom's [15] argument that effective management of common-pool resources requires institutional arrangements that incorporate local incentives, trust, and community participation. Local governments that neglect these elements risk perpetuating ecological degradation while also fostering social conflict.

Nevertheless, some positive initiatives have emerged. The local government has begun collaborating with community organizations in river-cleaning campaigns and environmental education programs. These initiatives resonate with the principle of **collaborative governance**, which emphasizes joint problem-solving and shared responsibility among multiple stakeholders [9] [23]). While still limited in scope, such efforts illustrate the potential of aligning formal policies with grassroots movements to build broader social-ecological resilience.

From a theoretical perspective, the government's role in the Kuantan River conservation reflects both the strengths and weaknesses of **human ecology theory**. Hawley [8] explains that human societies and ecological systems are interdependent, requiring institutions that adapt to ecological realities. In Kuantan Singingi, however, the government has yet to fully integrate ecological considerations into its development agenda, often prioritizing short-term economic gains over long-term sustainability. This tension mirrors the broader global challenge of balancing growth with environmental preservation [6].

Comparative evidence strengthens this analysis. For instance, in Bangladesh, Hasan, Shahriar, and Jim [4] documented how weak environmental governance led to severe water pollution, undermining both public health and agricultural productivity. Similarly, Ali and Kamraju [5] found that community participation significantly improved water governance outcomes in India, but only when supported by strong institutional backing from local authorities. These cases suggest that while community action is critical, government leadership remains indispensable in setting regulatory standards, providing technical expertise, and ensuring accountability.

The results also underscore the **contradictions inherent in decentralized governance**. On one hand, decentralization is expected to bring decision-making closer to local communities, thereby enhancing responsiveness and accountability. On the other hand, in practice, it often leads to fragmented policies, limited oversight, and opportunities for local elites to capture resources [11]. In the case of the Kuantan River, the decentralization framework has not yet translated into effective ecological management, largely due to the lack of integration

between formal government policies and indigenous knowledge systems.

In conclusion, the study finds that the **local government's role is both necessary and insufficient**. It is necessary because only the government has the formal authority to regulate mining, allocate resources, and enforce laws. Yet it is insufficient because without genuine collaboration with local communities, indigenous institutions, and civil society, government policies lack legitimacy and effectiveness. Strengthening local government capacity, enhancing law enforcement, and institutionalizing collaborative governance frameworks are therefore essential steps for ensuring the long-term sustainability of the Kuantan River.

This section can be completed with tables or figures related to the discussion. Example of a table:

Table 1. Local Government Initiatives and Challenges in Preserving the Kuantan River

No.	Government Initiative / Policy	Implementation Status	Main Challenges Identified
1	Issuance of local regulations on mining control	Regulations introduced but weakly enforced	Limited law enforcement capacity; political resistance
2	Environmental monitoring programs	Conducted irregularly	Lack of technical staff and equipment
3	River conservation campaigns (clean-up activities)	Implemented with community collaboration	Limited funding; low community participation
4	Integration of river protection in regional plans	Partially mainstreamed	Economic priorities overshadow ecological needs
5	Partnerships with NGOs and cultural institutions	Initiated but not sustained	Lack of institutional continuity

Source: Research results, field observations, and interviews 2025

The Role of Local Communities in Preserving the Ecology of the Kuantan River in Kuantan Singingi Regency

The findings of this study reveal that **local communities play an indispensable role in the conservation of the Kuantan River**, complementing and, in some cases, compensating for the limitations of local government policies. Communities living along the riverbanks are both the primary beneficiaries of the river's resources and the most directly affected by its degradation. Their involvement therefore represents not only a matter

of environmental responsibility but also of social and cultural survival.

Community-based initiatives have emerged in response to the ecological crisis caused by *Penambangan Emas Tanpa Izin* (PETI). Several villages have organized **river-cleaning campaigns, waste management groups, and educational activities** aimed at raising awareness about sustainable water use. These initiatives reflect a form of *gotong royong* (mutual cooperation), a deeply rooted Indonesian cultural practice that emphasizes collective responsibility [10]. The success of such initiatives aligns with Ostrom's [15] theory of common-pool resource management, which stresses that collective action, social trust, and locally developed norms are crucial for the sustainable governance of shared resources.

The **cultural dimension** further reinforces community involvement. The Kuantan River is central to the annual *Pacu Jalur* festival, a cultural heritage event that fosters solidarity and strengthens local identity. Communities perceive the degradation of the river not only as an environmental loss but also as a cultural threat. By framing river conservation as an extension of cultural preservation, communities legitimize their environmental actions and mobilize broader participation. Similar patterns have been observed in other regions where cultural identity is tied to ecological systems; for example, in the Philippines, community-based river monitoring gained legitimacy through integration with local traditions [5].

Despite these positive initiatives, **challenges remain**. Interviews indicate that community participation often faces constraints such as limited financial resources, lack of technical expertise, and competing economic priorities. Many households rely on PETI as a source of income, creating internal contradictions between environmental awareness and livelihood needs. This dilemma echoes findings in Bangladesh, where weak economic alternatives limited community compliance with environmental initiatives [4]. Without viable livelihood substitutes, community-driven conservation efforts risk losing sustainability.

Another key finding is that **the relationship between communities and government policies is ambivalent**. While communities support initiatives such as clean-up programs and environmental

education, they express skepticism toward government enforcement of mining regulations. Some perceive the government as inconsistent in curbing PETI, while others highlight the absence of long-term planning. This dynamic reflects the arguments of collaborative governance theory, which holds that successful governance requires trust-building, mutual accountability, and shared decision-making among stakeholders [9] [23]. The lack of effective communication and joint planning between communities and government undermines the potential for synergy.

From a human ecology perspective, the community's role demonstrates the **adaptive strategies of local societies** in maintaining equilibrium with their environment [8]. Communities adapt culturally and socially to environmental stress by mobilizing traditional practices, fostering cooperation, and redefining ecological values. However, the persistence of PETI reveals the limits of adaptation when socio-economic pressures outweigh environmental considerations. This suggests that without structural support, community efforts will remain fragmented and vulnerable to the dominance of exploitative practices.

The study also found that communities are **agents of social monitoring**. Residents often act as informal watchdogs, reporting illegal mining activities to local leaders and socializing environmental values through religious gatherings and customary meetings. Such informal institutions play a critical role in sustaining collective awareness, as documented by Sihsubekti [24], who emphasized that community participation in water governance is key to improving river quality in Indonesia. By embedding environmental values within everyday practices, communities contribute to the construction of ecological citizenship.

To strengthen community roles, several measures are essential: providing technical assistance, creating alternative economic opportunities, and institutionalizing participatory platforms for dialogue with the government. Lessons from India demonstrate that the integration of community groups into formal water management committees significantly improved compliance and water quality outcomes [5]. Therefore, institutionalizing mechanisms for continuous collaboration between communities and government can transform fragmented efforts into a coherent conservation strategy.

Table 2. Community-Based Initiatives for Kuantan River Conservation

No.	Community Initiative	Description	Challenges Identified
1	River-cleaning campaigns (<i>gotong royong</i>)	Collective activities to remove waste and debris from the river	Limited participation; lack of equipment
2	Waste management groups	Village-based initiatives to reduce plastic and household waste	Inconsistent practices; financial constraints
3	Environmental education in schools	Local NGOs and leaders conducting awareness sessions	Low outreach beyond youth
4	Cultural reinforcement (<i>Pacu Jalur</i>)	Framing river conservation as part of cultural heritage	Seasonal, not continuous
5	Informal monitoring of PETI	Residents reporting illegal activities to village heads	Fear of conflict with miners

Source: Research results, field observations, and interviews 2025

Synergy Between Government and Community: Integrating Adat Law and Environmental Law in the Conservation of the Kuantan River

The results of this study highlight that the most promising approach to preserving the Kuantan River lies in the **synergy between government policies, community initiatives, and the integration of adat (customary) law with modern environmental law**. While local government provides the institutional framework and enforcement capacity, communities contribute cultural legitimacy and grassroots participation. The convergence of these elements offers a multidimensional pathway to river conservation that is both legally binding and socially sustainable.

Adat Law as Cultural Legitimacy

Field findings demonstrate that adat law continues to play a critical role in shaping community attitudes toward the river. The declaration against illegal gold mining (*Penambangan Emas Tanpa Izin* or PETI), led by the Regent of Kuantan Singingi together with adat leaders in August 2024, symbolized this cultural legitimacy. By invoking adat norms, the declaration framed river conservation not only as an ecological necessity but also as a moral and cultural obligation. This mirrors findings from Indonesia and beyond, where indigenous law has been effective in reinforcing compliance with environmental norms

[25]. Adat law operates through communal sanctions, social shaming, and collective agreements, mechanisms that resonate strongly within the local cultural context. Unlike formal law, which often relies on external enforcement, adat law fosters internalized compliance based on identity and tradition (Fitzpatrick, 2005). For the Kuantan River, adat law mobilizes social cohesion by linking ecological preservation with cultural practices such as the *Pacu Jalur* festival.

Environmental Law as Formal Enforcement

On the other hand, Indonesia's environmental law, particularly **Law No. 32/2009 on Environmental Protection and Management**, provides the formal regulatory framework for managing rivers and sanctioning illegal activities. This law mandates local governments to control pollution, preserve biodiversity, and enforce environmental standards. However, as noted in this study, enforcement remains weak due to limited resources, fragmented institutional responsibilities, and conflicting economic interests [13]. Comparative evidence shows that such gaps are not unique to Indonesia. In Bangladesh, for instance, environmental laws exist but are rarely enforced effectively, leading to severe water pollution and public health crises [4]. Similarly, Moss [7] observed that even in Europe, legal frameworks like the EU Water Framework Directive struggle when institutional design is misaligned with ecological realities. These findings suggest that laws alone cannot ensure ecological sustainability without complementary social legitimacy.

The Need for Synergy

The results emphasize that **neither adat law nor environmental law is sufficient on its own**. If conservation relies solely on environmental law, compliance is limited, and enforcement becomes costly. Conversely, if it depends only on adat law, enforcement lacks legal authority and may be contested by actors outside the community. Synergy between the two is therefore essential: adat law provides the cultural and moral foundation for compliance, while environmental law ensures legal certainty and formal sanctioning power. This synergy reflects the principles of **collaborative governance**, where diverse institutions and stakeholders contribute their strengths to address complex environmental problems [9] [23]. In the Kuantan River case, collaborative governance manifests in joint declarations, shared river-cleaning

campaigns, and the inclusion of adat leaders in government-led consultations.

International Comparisons

Global experiences illustrate the value of integrating customary and formal legal systems. In the Philippines, the Indigenous Peoples' Rights Act (1997) recognizes ancestral domains and customary water rights, enabling indigenous communities to regulate resource use through both formal and traditional mechanisms [26]. In Nepal, community forestry programs have successfully combined statutory law with traditional norms, empowering local users to manage forests while complying with national regulations [27]. In Australia, indigenous water governance frameworks demonstrate how traditional ecological knowledge can complement statutory water management [28]. These examples underline that hybrid legal systems often achieve higher compliance and sustainability than purely state-driven or purely customary approaches.

Challenges to Integration

Despite its potential, the integration of adat and environmental law faces significant obstacles. First, there is a **legal pluralism challenge**: Indonesian law recognizes adat institutions only conditionally, creating uncertainty about their authority [25]. Second, the **risk of co-optation** exists, where adat leaders may be influenced by political or economic interests, undermining the credibility of customary norms [29]. Third, effective integration requires sustained dialogue, which is often absent in practice due to mistrust between government officials and local communities. These challenges highlight the need for institutional innovation. Mechanisms such as **joint river management committees** that include government agencies, adat leaders, and civil society actors could provide platforms for sustained collaboration. Legal reforms that formally recognize adat regulations on river management would further enhance legitimacy and reduce conflicts between legal systems.

Author's Position

This study argues that the **integration of adat and environmental law offers the most viable path toward sustainable river governance** in Kuantan Singingi. While government regulation provides enforcement capacity, adat law mobilizes cultural legitimacy and community participation. Without this synergy, conservation policies risk remaining either ineffective or unsustainable. The Kuantan River case demonstrates that ecological resilience is not merely a technical issue but a socio-legal process requiring the alignment of multiple normative systems.

Table 3. Complementary Roles of Adat Law and Environmental Law in River Conservation

Aspect	Adat Law	Environmental Law (Law No. 32/2009)	Synergy Outcome
Source of legitimacy	Cultural values, traditions, social norms	Formal legal authority, statutory framework	Dual legitimacy (social + legal)
Enforcement	Social sanctions, collective agreements	Legal sanctions, institutional authority	Stronger compliance through combined enforcement
Scope	Localized, community-based	National and regional coverage	Multi-level governance
Strengths	High social acceptance, embedded in culture	Legal certainty, formal resources	Complementary strengths for sustainability
Weaknesses	Limited authority outside community	Weak enforcement, low legitimacy in community	Integration reduces weaknesses of each system

Source: Research results, interviews, and comparative studies 2025



Source: Research results

Figure 1. The Regent of Kuantan Singingi leading the Customary Declaration Against PETI (Source: Field Documentation, 29/8/2025).

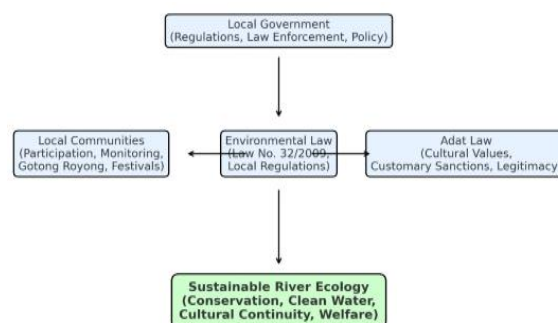


Figure 2: illustrates the framework of synergy between government, communities, adat law, and environmental law in conserving the Kuantan River. The government contributes through regulations and enforcement, while communities provide grassroots participation and social monitoring. Adat law strengthens cultural legitimacy through customary

sanctions and identity, whereas environmental law ensures formal authority and legal certainty. Together, these elements converge to achieve sustainable river ecology that supports both environmental and cultural continuity.

4. Conclusion

This study set out to examine the roles of local government and communities in the preservation of the Kuantan River in Kuantan Singingi Regency, with particular attention to the interaction between adat law and environmental law. The findings demonstrate that effective river conservation cannot be achieved through fragmented approaches; rather, it requires an integrated framework that unites formal state authority, community participation, and cultural legitimacy.

First, the research highlights the critical role of the local government as the primary policy-maker and regulator. Through the issuance of local regulations, environmental monitoring, and public campaigns, the government has laid the institutional foundation for ecological management. However, weak enforcement, limited resources, and competing economic priorities undermine the effectiveness of these policies. Without consistent implementation, government initiatives remain symbolic rather than transformative.

Second, the results emphasize the indispensable contribution of local communities. Communities along the Kuantan River have developed grassroots initiatives such as collective river-cleaning campaigns, waste management groups, and cultural reinforcement through the Pacu Jalur festival. These activities illustrate the persistence of gotong royong as a cultural value that translates into environmental stewardship. Nevertheless, community action is constrained by economic dependence on illegal mining, limited technical expertise, and inadequate support systems. This contradiction reveals that while communities possess cultural motivation, their capacity for long-term ecological management is fragile without external reinforcement.

Third, the study finds that the synergy between government and communities is most effective when adat law and environmental law are integrated. Adat law provides cultural legitimacy, embedding ecological values within social identity and traditions. Environmental law ensures legal certainty, institutional authority, and formal mechanisms for accountability. Together, these normative systems create a dual legitimacy—social and legal—that strengthens compliance and sustainability. The joint declaration against illegal mining, led by the Regent of Kuantan Singingi and adat leaders, serves as a concrete example of this integration in practice.

The comparative analysis further confirms that hybrid governance frameworks, combining statutory and customary norms, are not unique to Kuantan Singingi. Experiences from the Philippines, Nepal, and Australia show that when governments formally recognize indigenous institutions and integrate them into environmental governance, compliance increases and resource sustainability improves. These international parallels reinforce the conclusion that pluralistic legal systems offer greater resilience in managing common-pool resources such as rivers.

From a theoretical perspective, the findings align with collaborative governance theory and human ecology, both of which stress the necessity of interdependence between institutions, communities, and ecological systems. The Kuantan River case demonstrates that environmental governance is not merely a technical or legal process but also a socio-cultural negotiation in which multiple stakeholders share responsibilities and benefits.

In conclusion, this research argues that the preservation of the Kuantan River requires a paradigm shift from fragmented, top-down governance to integrated, collaborative, and culturally grounded governance. Strengthening the capacity of local government, empowering communities, and institutionalizing the role of adat law alongside environmental law are crucial steps toward this goal. Sustainable river ecology can only be achieved when governance frameworks are inclusive, culturally legitimate, and legally enforceable. The Kuantan River thus stands as both a challenge and an opportunity: a challenge in confronting the ecological degradation caused by illegal mining, and an opportunity to pioneer a model of integrated governance that may inspire similar efforts across Indonesia and beyond.

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