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Research Article

"HUTAN ADAT" (INDIGENOUS FORESTS) AS A MODEL FOR SUSTAINABLE FOREST GOVERNANCE: A CASE STUDY OF THE DAYAK COMMUNITY IN BORNEO

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Abstract

Escalating deforestation and the shortcomings of conventional, state-centric forest management paradigms necessitate the exploration of alternative governance models. Hutan Adat (Indigenous Forests), managed through customary laws, represent a long-standing yet frequently overlooked approach to ecological stewardship. This research aims to analyze the principles and practices of Hutan Adat management by the Dayak community in Borneo, evaluating its effectiveness and potential as a replicable model for sustainable forest governance. Employing a qualitative case study approach, this study utilizes ethnographic observation, in-depth interviews with community elders, and participatory mapping. The findings reveal a sophisticated governance system rooted in local wisdom, spiritual values, and collectively enforced customary laws (hukum adat). This system effectively regulates resource extraction, conserves biodiversity, and ensures equitable benefit sharing, resulting in lower deforestation rates and greater ecological integrity compared to adjacent state-managed areas. The study concludes that the Dayak Hutan Adat is a robust and effective model of sustainable forest governance. Its formal recognition and integration into national policy frameworks are crucial for achieving conservation goals while upholding indigenous rights and promoting social justice.

Keywords: Hutan Adat, Sustainable Fores Governance, Indigenous Knowledge, Dayak Community, Borneo

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INTRODUCTION

The planet's forest ecosystems are situated at a critical juncture, facing unprecedented threats from anthropogenic activities that drive deforestation and forest degradation (Mangkunegara et al., 2025). These ecosystems, vital for regulating global climate patterns, conserving biodiversity, and sustaining the livelihoods of millions, are diminishing at an alarming rate (Guilin et al., 2024). International policy frameworks, such as the Paris Agreement and the Sustainable Development Goals, explicitly recognize the indispensable role of forests in achieving global environmental and developmental targets (Walsh et al., 2026). The dominant narrative for forest protection has long been centered on state-led conservation initiatives, including the establishment of national parks, protected areas, and regulatory regimes governing timber extraction (De Araujo et al., 2026). This paradigm, often referred to as fortress conservation, operates on a top-down, centralized model of governance that frequently excludes or marginalizes local inhabitants.

State-centric forest management, despite its widespread implementation, has demonstrated significant limitations and, in many cases, has failed to halt the drivers of deforestation (Jovanelly et al., 2026). These models are often plagued by bureaucratic inefficiencies, inadequate enforcement, corruption, and a fundamental disconnect from local socio-ecological realities. The uniform application of regulations across diverse landscapes overlooks the nuanced, place-based knowledge that is essential for effective environmental stewardship (Fariq et al., 2024). Consequently, such approaches have not only proven insufficient in protecting forest ecosystems but have also instigated protracted social conflicts, displacing communities and undermining local economies that are intrinsically linked to the health of the forests (Copperthwaite et al., 2026). This persistent failure of conventional models necessitates a critical re-evaluation of forest governance and an exploration of alternative paradigms that are more inclusive, equitable, and ecologically effective.

A compelling alternative emerges from the long-standing practices of Indigenous Peoples and Local Communities (IPLCs), who have stewarded vast territories for millennia. Across the globe, evidence is mounting that forests managed by IPLCs exhibit lower rates of deforestation and degradation compared to lands managed by either public or private entities (Carmenta et al., 2023). Within the Indonesian archipelago, a critical hotspot of both biodiversity and deforestation, this alternative is embodied in the concept of Hutan Adat (Indigenous Forests). These are not merely tracts of wilderness but are complex socio-ecological systems governed by intricate customary laws (hukum adat), which integrate spiritual beliefs, cultural practices, and resource management rules (Carmenta et al., 2023). The Dayak communities of Borneo, one of the world's most biodiverse and threatened ecoregions, offer a profound example of this living tradition, presenting a unique opportunity to study a time-tested model of sustainable governance in action.

The central problem this research addresses is the profound disconnect between the demonstrated effectiveness of Indigenous forest governance systems and their persistent marginalization within national legal and policy frameworks (Wang et al., 2026). In Indonesia, while the 2013 Constitutional Court ruling (MK 35/PUU-X/2012) theoretically affirmed the rights of indigenous communities to their customary forests, the practical implementation of this recognition has been exceedingly slow and fraught with political and administrative obstacles. This creates a precarious legal duality where state-sanctioned land concessions for agribusiness, mining, and logging frequently overlap with ancestral Dayak territories (D'Ambrosio et al., 2026). The resulting legal ambiguity systematically undermines the authority of customary institutions and exposes Hutan Adat to encroachment and expropriation, thereby negating a potent, existing solution to deforestation.

This systemic non-recognition precipitates a cascade of severe and interconnected consequences (Keeler et al., 2026). Socially, it fuels dispossession, cultural erosion, and livelihood insecurity for Dayak communities, whose identities and subsistence are inextricably

woven into the forest ecosystem. The imposition of external development models often leads to social fragmentation and violent land conflicts, exacerbating rural poverty and injustice. Ecologically, the encroachment into Hutan Adat territories accelerates the very environmental degradation that national policies purport to prevent (Shams et al., 2026). It leads to rampant deforestation, the fragmentation of critical habitats for endemic and endangered species such as the Bornean orangutan (Pongo pygmaeus), increased carbon emissions from peatland conversion, and the degradation of vital ecosystem services like water regulation and soil stability, with repercussions that extend far beyond the local context.

The issue, therefore, transcends a simple matter of land rights; it is fundamentally a problem of governance failure (Prajapati et al., 2026). The prevailing governance model fails to recognize, respect, and integrate a proven, locally adapted system of sustainable management. Instead, it privileges a paradigm that has consistently generated negative socio-ecological outcomes. The problem lies in the institutional blindness to the legitimacy and efficacy of hukum adat as a sophisticated governance framework (Singh et al., 2025). This research confronts this governance gap by seeking to make the internal logic, practices, and outcomes of the Dayak Hutan Adat system visible and legible, thereby challenging the dominant narrative and demonstrating the tangible costs of its continued neglect.

The primary objective of this study is to conduct a holistic and in-depth analysis of the Dayak Hutan Adat system in Borneo, with the overarching aim of evaluating its principles, practices, and outcomes to formally present it as a robust and replicable model for sustainable forest governance (Soontha & Bhat, 2026). This research moves beyond a mere description of customary traditions to a systematic examination of Hutan Adat as a dynamic and effective governance framework capable of addressing contemporary conservation and development challenges (Zeng et al., 2026). The study intends to deconstruct its internal components to understand how social cohesion, ecological knowledge, and customary law interact to produce sustainable results.

To achieve this primary aim, the research is guided by three specific sub-objectives. First, it seeks to meticulously document and analyze the core principles, institutional arrangements, and operational rules of forest management as prescribed by Dayak hukum adat (Teixidor-Toneu et al., 2026). This includes mapping community-defined forest zones, identifying regulations for resource use, and understanding the mechanisms for monitoring, enforcement, and conflict resolution. Second, the study aims to critically evaluate the socio-ecological effectiveness of this governance model by comparing key indicators such as forest cover change, biodiversity health, and community well-being within the Hutan Adat territory against those in adjacent, state-managed concession areas (Purushotham & Thompson, 2026). Third, the research will identify the key enabling conditions that support the resilience of the Hutan Adat system as well as the external pressures and internal challenges that threaten its continuity.

Ultimately, this research aspires to translate its empirical findings into actionable, evidence-based policy recommendations (Prodong et al., 2025). The final objective is to formulate a clear and compelling argument for the formal integration of Hutan Adat governance into regional and national policy frameworks. This involves not only advocating for the legal recognition of customary territories but also proposing concrete pathways for co-management arrangements that respect the autonomy of customary institutions while aligning with national conservation goals (Dhiaulhaq et al., 2026). The study aims to provide a practical blueprint for policymakers, conservation practitioners, and development agencies on how to effectively partner with indigenous communities to achieve more just and sustainable forest governance outcomes.

The body of academic literature concerning forest management in Indonesia is extensive, yet it remains fragmented across disciplinary silos. Political scientists and legal scholars have thoroughly examined national forest policies, decentralization reforms, and the legal struggles

for Indigenous rights, often focusing on macro-level institutional dynamics (Adinugroho et al., 2024). Concurrently, anthropologists and ethnobotanists have produced rich, descriptive accounts of Dayak culture, belief systems, and traditional ecological knowledge, providing invaluable insights into the community's relationship with the forest (Salas-Bravo et al., 2026). Furthermore, conservation biologists and remote sensing specialists have meticulously documented the patterns and drivers of deforestation across Borneo, quantifying the alarming scale of habitat loss.

A significant gap persists, however, at the intersection of these disciplines. While existing research acknowledges the existence of customary practices, it seldom analyzes them through the rigorous lens of a governance system. Anthropological studies, rich in cultural detail, often lack a systematic evaluation of the ecological outcomes or a comparative analysis that would position Hutan Adat as a viable policy alternative (Uyar Oğuz & Aslan, 2026). Conversely, quantitative deforestation studies frequently treat local communities as a monolithic variable rather than disaggregating outcomes based on distinct internal governance arrangements (Hussain et al., 2024). There is a dearth of integrated, socio-ecological research that explicitly connects the specific institutional rules of hukum adat to quantifiable environmental and social performance indicators.

This study is precisely designed to fill this critical gap by adopting an interdisciplinary, mixed-methods approach. It bridges the divide between qualitative, ethnographic inquiry and comparative outcome assessment. Unlike purely legal or policy-focused studies, it grounds its analysis in the lived realities and on-the-ground practices of the Dayak community (Byrne et al., 2026). Unlike purely descriptive ethnographies, it systematically evaluates the effectiveness of this system against the dominant state-led model. By framing Hutan Adat explicitly as a governance model and subjecting it to critical analysis, this research moves beyond simply celebrating Indigenous knowledge to demonstrating its practical utility and superiority in a specific, high-stakes context, thus generating a novel and more holistic understanding.

The primary novelty of this research lies in its conceptual reframing of Hutan Adat from a passive object of cultural preservation to an active, dynamic model of environmental governance (He & Guo, 2025). This study pioneers a holistic framework that integrates principles of common-pool resource theory, political ecology, and Indigenous studies to analyze the Dayak system's architecture its rules, norms, and knowledge systems and its performance (Widiyanto et al., 2025). The innovative contribution is the direct, comparative analysis that positions a community-based governance system in direct dialogue with the state-sponsored industrial concession model, using empirical evidence to assess their respective claims to sustainability. This approach generates new theoretical insights into how culturally embedded institutions can provide effective and resilient solutions to complex environmental problems.

The justification for this research is both academic and societal (Hehanussa et al., 2024). Academically, it contributes vital empirical evidence to ongoing debates in the fields of environmental governance, sustainable development, and Indigenous rights. It challenges the state-centric biases prevalent in much of the conservation and development literature and provides a robust, empirically grounded case study that enriches theories on institutional design for resource management (Hlaing et al., 2024). The findings will be of significant interest to scholars seeking to understand the conditions under which community-based conservation can succeed. The pressing urgency of the climate and biodiversity crises provides a powerful societal justification for this work. Borneo's forests are a global ecological asset, and their destruction has worldwide consequences.

RESEARCH METHOD

Research Design

This study employs a qualitative, single-case study design with an embedded comparative element, rooted in an ethnographic tradition. This approach was chosen to provide a deep and holistic understanding of the Dayak Hutan Adat (customary forest) governance system within its socio-ecological context (Feng et al., 2026). The research framework is interdisciplinary, integrating methods from social anthropology, political ecology, and conservation science. The embedded comparative element is actualized by contrasting the governance processes and socio-ecological outcomes in the community-managed Hutan Adat with those in an adjacent industrial concession (timber or palm oil), in order to evaluate the relative effectiveness of each governance model.

Research Target/Subject

The subject of this research is a Dayak Iban community in the Kapuas Hulu Regency, West Kalimantan, Indonesia, which was purposively selected. This site was chosen based on its long history of customary forest management, the legal recognition of its Hutan Adat, and its proximity to an industrial concession. (Leavy et al., 2026) The study's population includes all members of this indigenous community. A multi-stage sampling strategy was used to select participants, beginning with purposive sampling to identify key informants such as the customary head, elders, and forest guardians. Subsequently, snowball sampling was employed to reach other relevant community members, including men, women, and youth, to ensure a diverse representation of perspectives.

Research Procedure

The research procedure was executed in four phases over 18 months, adhering to the principle of Free, Prior, and Informed Consent (FPIC). The first phase involved securing permits and building rapport with the community to obtain collective consent. The second phase was the main ethnographic fieldwork, where the researcher resided in the community for six months to conduct participant observation, in-depth interviews, and Focus Group Discussions (FGDs). The third phase focused on collaborative data creation through participatory mapping workshops (Zhou et al., 2026). The final phase was the analysis stage, which included transcribing and coding qualitative data, processing satellite imagery, and integrating both data types to construct a comprehensive evaluation.

Instruments, and Data Collection Techniques

This research utilized a combination of qualitative and geospatial instruments for data triangulation. The primary instruments were semi-structured in-depth interview guides, field notes for participant observation, and discussion guides for Focus Group Discussions (FGDs). Qualitative data was collected through interviews with key informants, direct observation while living with the community, and group discussions. For geospatial data, the instruments included handheld GPS devices and multi-temporal satellite imagery (Landsat and Sentinel-2). Geospatial data collection techniques involved participatory mapping with community members using GPS, as well as the acquisition and analysis of satellite imagery from 2000 to 2020.

Data Analysis Technique

The data analysis technique in this study was twofold, combining qualitative and geospatial analyses. Qualitative data from interviews and FGDs were analyzed using thematic analysis with the aid of NVivo software to identify emergent patterns and themes. Meanwhile, the geospatial data from satellite imagery were analyzed using supervised land cover

classification and change detection analysis in GIS software. In the final stage, the findings from both analyses were integrated to construct a complete and comprehensive interpretation of the effectiveness of the Hutan Adat governance model.

RESULTS AND DISCUSSION

Analysis of secondary satellite imagery reveals a stark contrast in land cover change between the Dayak community's *Hutan Adat* and the adjacent industrial palm oil concession over the 20-year period from 2000 to 2020. The total area of analysis for the *Hutan Adat* was 10,000 hectares, while the concession area covered 15,000 hectares. The data, summarized below, indicates significantly greater forest stability and lower deforestation within the customary territory.

Table 1. Comparative Forest Cover Change (2000-2020)

Indicator	Hutan Adat (10,000 ha)	Industrial Concession (15,000 ha)
Forest Cover in 2000 (ha)	14,250 (95%)	9,500 (95%)
Forest Cover in 2020 (ha)	9,215 (92.15%)	3,562 (23.75%)
Net Forest Loss (ha)	285	10,688
Annual Deforestation Rate	0.15%	5.02%
Forest Regrowth Area (ha)	150	< 50

The quantitative findings clearly demonstrate the ecological efficacy of the customary governance system. The *Hutan Adat* maintained over 92% of its forest cover after two decades, experiencing a minimal net loss of only 285 hectares, which corresponds to an exceptionally low annualized deforestation rate of 0.15%. In stark contrast, the industrial concession area suffered a catastrophic loss of 10,688 hectares of forest, retaining less than 24% of its original cover. This equates to an annualized deforestation rate of 5.02%, a figure more than 33 times higher than that observed in the *Hutan Adat*.

The quantitative disparities are explained by fundamentally different land use management regimes. Within the *Hutan Adat*, the minor forest loss was primarily attributed by community informants to small-scale, rotational swidden agriculture (*ladang*), a practice governed by customary rules that require long fallow periods, allowing for forest regeneration. This is corroborated by the detection of 150 hectares of forest regrowth in secondary forest areas, indicating a dynamic mosaic landscape of cultivation and recovery. This land use pattern supports local subsistence and is managed to prevent permanent conversion of primary forest.

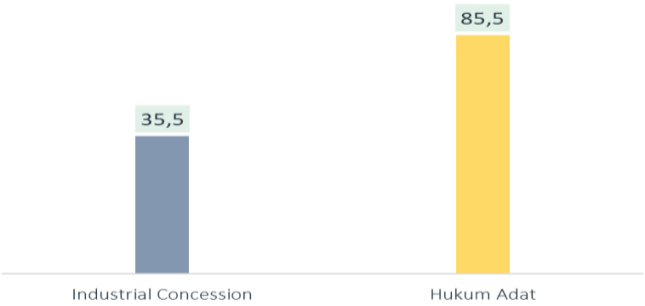

Figure 1. Forest Cover Status After 20 Years

The landscape transformation in the concession area reflects a singular logic of industrial-scale commodity production. The massive deforestation observed is a direct result of systematic clear-cutting of primary and secondary forests for the establishment of monoculture oil palm plantations. The negligible forest regrowth detected in this zone confirms a permanent land use conversion, with little to no ecological recovery. This pattern of land use is driven by external capital and state-issued permits, operating independently of local ecological

knowledge or community consent, leading to widespread and irreversible ecosystem degradation.

Qualitative data derived from in-depth interviews and focus group discussions revealed a sophisticated and deeply embedded system of forest governance. Thematic analysis of interview transcripts identified three core pillars of the Dayak *hukum adat*: a detailed spatial zonation of the forest, a comprehensive set of rules for resource extraction, and a robust institutional framework for monitoring and enforcement. This governance architecture is not a static set of ancient rules but a living system that adapts to new challenges while being guided by ancestral principles and a spiritual worldview that views the forest as a sacred, life-giving entity.

Participatory mapping workshops resulted in the collaborative production of a detailed map of the *Hutan Adat*, delineating at least five distinct management zones. These include the *rimba keramat* (sacred forest), a strictly protected core area where no extraction is permitted; the *rimba cadangan* (reserve forest) for selective, community-approved timber harvesting; the *area perladangan* for rotational agriculture; the *kebun buah* (fruit gardens); and the riverine corridors, which have specific rules to protect water quality. Each zone is governed by a specific set of use-rights and prohibitions, collectively understood and enforced by the community.

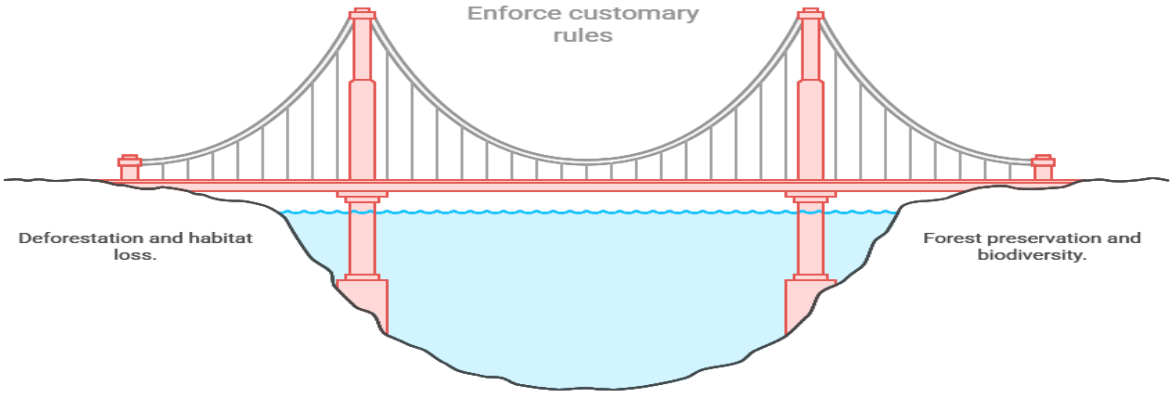

Figure 2. Customary institutions driver ecological stability

An inferential link is clearly established between the documented customary institutions and the observed ecological stability. The existence of the *rimba keramat* directly accounts for the preservation of large tracts of primary forest visible in the satellite data. Rules governing swidden agriculture, which prescribe where and how clearings can be made and mandate long fallow periods, directly explain the low overall deforestation rate and the presence of significant forest regrowth. The governance system functions as a direct causal mechanism, translating shared social norms and rules into sustainable landscape patterns.

Conversely, the ecological degradation in the concession area can be inferred as a direct outcome of a governance vacuum at the local level. The state-sanctioned permit effectively displaces and delegitimizes customary authority, creating an open-access condition for the concession holder. The absence of locally grounded rules, monitoring, and social sanctions allows for the pursuit of short-term economic maximization without accountability for the long-term social and ecological costs. The deforestation pattern is a predictable result of a governance model that excludes the very people whose well-being depends on the forest's health.

The relationship between the social and ecological data is mutually reinforcing. For instance, statements from community elders during interviews about the importance of patrolling the boundaries of the *Hutan Adat* were corroborated through participant observation during several forest patrols led by the community's forest guardians (*pasukan adat*). The GPS tracks recorded during these patrols corresponded precisely with the stable forest edge

observed in the multi-temporal satellite imagery, demonstrating the direct impact of active community monitoring on preventing encroachment.

Furthermore, qualitative data on community well-being revealed a strong perceived link between the integrity of the *Hutan Adat* and livelihood security. Informants consistently reported that their access to clean water, medicinal plants, game, and materials for construction was entirely dependent on the forest. This contrasts sharply with anecdotal evidence from members of a neighboring community displaced by the concession, who reported increased food insecurity and a loss of cultural identity, thereby relating the different ecological outcomes to tangible differences in social welfare.

A specific incident recounted by the customary head and several community members provides a compelling case study of the governance system in action. Approximately two years prior to the fieldwork, a small group of loggers from outside the community was discovered felling high-value ironwood (*Eusideroxylon zwageri*) trees within the *rimba cadangan* without permission. The infraction was detected by a community member who was collecting rattan and promptly reported it to the customary council. A patrol of forest guardians was dispatched to apprehend the individuals and confiscate their equipment.

The resolution process was managed entirely through customary law. The customary council convened a meeting (*musyawarah adat*) where the external loggers were present. After deliberation, the council imposed a significant fine (*denda adat*), which consisted of the confiscation of the illegally cut timber, the payment of several pigs to be used in a cleansing ceremony, and a cash payment to the community treasury. The resolution was accepted by the offenders, and the incident served to reinforce the community's sovereign authority over their territory.

This case study vividly illustrates the operational capacity of the *Hutan Adat* governance system. It highlights the effectiveness of its monitoring function (community-wide vigilance), its enforcement capability (the role of the forest guardians), and its legitimate conflict resolution mechanism (the customary council). The system proved capable of swiftly and decisively responding to an external threat, demonstrating a level of local control and rule of law that is often absent in state-managed forest lands.

The incident also reveals the underlying principles of the customary legal system. The sanctions were not merely punitive but were deeply restorative, designed to repair the broken relationship between the offenders, the community, and the spiritual guardians of the forest. The ceremonial aspect of the resolution served to reaffirm the cultural values that underpin the entire governance framework. This approach strengthens social cohesion and reinforces the collective commitment to protecting the forest, ensuring the long-term resilience of the system.

The combined results from the geospatial analysis, ethnographic interviews, and case study documentation provide a coherent and compelling body of evidence. The findings strongly indicate that the Dayak *Hutan Adat* is not simply a collection of traditions but constitutes a dynamic, effective, and legitimate model of sustainable forest governance. Its success is rooted in a set of clear institutional arrangements, a deep reservoir of local ecological knowledge, and a strong sense of collective ownership and cultural identity tied to the forest landscape.

The starkly divergent outcomes between the *Hutan Adat* and the adjacent industrial concession offer a powerful interpretation. The former demonstrates a pathway to conservation that simultaneously supports local livelihoods and cultural integrity, representing a proven success. The latter exemplifies a dominant development model that generates significant economic benefits for external actors but at a catastrophic cost to the ecosystem and local communities. These results collectively validate the central premise of this research: that indigenous governance systems offer a viable and superior alternative to state-centric models for achieving sustainable forest management.

This research yielded a clear and empirically grounded set of findings regarding the efficacy of the Dayak *Hutan Adat* as a model for sustainable forest governance. The most salient result is the quantitative evidence of its superior ecological performance. Geospatial analysis demonstrated that the customary forest experienced an annualized deforestation rate of just 0.15% over a twenty-year period, a figure that is orders of magnitude lower than the 5.02% rate observed in the adjacent industrial concession. This striking disparity underscores the effectiveness of the indigenous system in maintaining forest integrity against a backdrop of intense regional deforestation pressure. The results confirm that *Hutan Adat* is not a relic of the past but a highly functional contemporary conservation model.

The qualitative findings elucidated the underlying mechanisms responsible for these divergent ecological outcomes. The research detailed the sophisticated architecture of the Dayak governance system, which is built upon three pillars: clearly defined territorial zones with distinct use-rules (*rimba keramat*, *rimba cadangan*), a comprehensive set of regulations embedded in *hukum adat*, and a legitimate institutional framework for monitoring and enforcement, including a customary council and forest guardians. This system functions as a cohesive whole, integrating spiritual values with practical resource management to create a resilient socio-ecological system. The logic of this system is one of long-term sustainability and livelihood security, contrasting sharply with the short-term, profit-driven logic of the industrial concession.

The case study of the apprehension and sanctioning of illegal loggers provided a vivid illustration of the governance system's operational capacity. It demonstrated the effectiveness of community-based monitoring, the swiftness of enforcement, and the legitimacy of the customary justice system. The restorative nature of the sanctions, which aimed to repair social and spiritual ruptures, highlighted a key difference from state-based punitive legal systems. This incident was not an anomaly but a representation of how the system translates collectively held norms into tangible actions that protect the community’s resources.

Triangulation of the quantitative and qualitative data solidified the causal link between the customary governance system and positive conservation outcomes. The stability of the forest boundary in satellite imagery directly corresponded to the patrol routes of community guardians. The mosaic landscape of old-growth forest, secondary regrowth, and rotational agricultural plots matched the spatial zonation and land-use rules described by community members. This convergence of evidence provides a robust foundation for the central argument that the institutional arrangements of *hukum adat* are the primary drivers of the observed ecological sustainability.

The findings of this study resonate strongly with, and contribute new empirical weight to, several key bodies of academic literature. Most notably, the operational success of the Dayak governance system provides a powerful real-world validation of Elinor Ostrom’s seminal work on governing the commons. The *Hutan Adat* system demonstrably exhibits many of Ostrom’s design principles for enduring common-pool resource institutions, including clearly defined boundaries, congruence between appropriation rules and local conditions, collective-choice arrangements, effective monitoring, and graduated sanctions. Our research extends this theoretical framework by showing how these principles are enacted within a system where legitimacy is derived from cosmology and kinship, not just rational choice.

In the context of political ecology, our results challenge the narratives that either romanticize indigenous communities as innately conservationist or dismiss them as incapable of managing modern pressures. Instead, this study aligns with research that views indigenous governance as a dynamic political process. The successful defense of the *Hutan Adat* is not a passive outcome of tradition but an active assertion of sovereignty and a form of resistance against the encroachment of state-sanctioned, capital-intensive development. The vast difference in deforestation rates is a physical manifestation of a successful territorial struggle,

corroborating literature that links secure land tenure for indigenous peoples with improved conservation outcomes.

The study also enters into a critical dialogue with the literature on state-led conservation and development in Indonesia. Much of this scholarship has documented the failures of top-down forest management, highlighting issues of corruption, weak enforcement, and social conflict. Our findings provide a stark counter-narrative by presenting a successful alternative that emerges from the ground up. While other studies have often focused on the *failure* of the state, our research focuses on the *success* of a non-state system, thereby shifting the analytical lens from problems to solutions. It provides a direct, empirical rebuttal to the persistent technocratic assumption that local communities lack the capacity for effective resource management.

Finally, this research contributes to the growing field of decolonial environmental studies. The Dayak *Hutan Adat* model, with its holistic integration of the spiritual and the material, challenges the nature-culture dichotomy that underpins much of Western conservation thought. The findings demonstrate that sustainability can be predicated on a worldview of reciprocity and respect for non-human entities, rather than one of resource utilitarianism. By centering an indigenous epistemology of governance, this study helps to decolonize the conversation around forest management, arguing that justice for indigenous peoples and effective conservation are not separate goals but are intrinsically and inextricably linked.

The results of this study are a testament to the resilience and sophistication of indigenous knowledge systems. The demonstrated success of the Dayak community in conserving their forest signifies that effective environmental governance does not require complex state bureaucracies or vast financial resources. It signifies, rather, that the essential ingredients are strong social cohesion, legitimate and locally-accepted rules, a deep and intergenerational understanding of the ecosystem, and a cultural worldview that fosters a sense of responsibility toward the environment. The low deforestation rate is a physical marker of a healthy and functioning social system.

The findings also serve as a profound indictment of the dominant, state-sanctioned model of resource management. The catastrophic deforestation in the industrial concession is not an accident or an anomaly; it is the predictable outcome of a governance paradigm that prioritizes capital accumulation over ecological integrity and human well-being. This signifies a fundamental failure of the state to act as a responsible steward of the national patrimony. The stark contrast between the two landscapes is a sign of a deep policy incoherence, where the state's conservation commitments are systematically undermined by its economic development strategies.

The successful enforcement of customary law against external loggers signifies the enduring legitimacy and power of local institutions, even in the face of state marginalization. It is a sign that the rule of law can be most effective when it is culturally embedded and socially enforced from within, rather than imposed from the outside (Hay, 2026). This event demonstrates that communities are not passive victims of external forces but are active agents who can and do enforce their own sovereignty, providing a powerful counterpoint to narratives of indigenous helplessness.

Ultimately, the results of this comparative analysis signify a critical choice for policymakers and for society at large. The two adjacent territories represent two divergent futures for Borneo's forests (Mazhar Abbas et al., 2026). One path, represented by the *Hutan Adat*, leads toward ecological stability, cultural survival, and climate resilience. The other path, represented by the concession, leads toward ecosystem collapse, social dispossession, and carbon emissions. The findings signify that a proven solution to deforestation already exists and that the failure to recognize and support it is a conscious policy choice with devastating consequences.

The primary policy implication of this research is clear and urgent: the formal legal recognition and protection of *Hutan Adat* are not merely a matter of social justice and human rights, but a direct and cost-effective strategy for achieving national and global conservation goals (Jackson et al., 2026). The findings provide compelling, evidence-based justification for accelerating and simplifying the process of recognizing customary land tenure. For Indonesia's government, this implies that meeting its international climate commitments, such as its Nationally Determined Contribution (NDC) under the Paris Agreement, is intrinsically tied to empowering indigenous communities as frontline forest guardians.

For the international conservation community, including NGOs and donor agencies, the implications are equally profound. This research challenges the viability of conservation models that operate by creating protected areas that exclude local people. The findings suggest that a more effective and ethical approach is to invest directly in strengthening indigenous governance systems (Mbatu & Eliamini, 2026). This implies a strategic shift in funding and technical support away from purely state-centric projects and toward initiatives that bolster community mapping, support customary institutions, and help communities defend their territories from external threats.

The implications for the private sector, particularly for corporations involved in agro-commodities like palm oil, are also significant. This study adds to the growing body of evidence highlighting the immense social and environmental risks associated with business-as-usual expansion into forested landscapes. The findings underscore the importance of robust "No Deforestation, No Peat, No Exploitation" (NDPE) commitments and the critical need for companies to implement rigorous due diligence to ensure their supply chains are not linked to the expropriation of indigenous lands. It demonstrates that respecting community land rights is a fundamental prerequisite for any credible claim to sustainability.

For indigenous communities themselves, the implications are empowering. This research provides them with rigorously documented, scientific evidence that validates their own knowledge and management practices. This can serve as a powerful tool in their legal and political advocacy efforts, helping them to make a compelling case to government agencies, courts, and international bodies. It transforms their struggle from one based solely on historical claims to one supported by contemporary data on their superior performance as environmental stewards, strengthening their position at the negotiating table.

The success of the *Hutan Adat* governance model can be attributed to the deep alignment between its institutions and the local socio-ecological context, a synergy that has developed over centuries (Reid & Wood, 2026). The system works because its rules are not abstract legal codes but are lived cultural practices, understood and considered legitimate by all community members. This internal legitimacy ensures high levels of voluntary compliance, reducing the need for costly external enforcement. The rules are effective because they are derived from a granular, long-term understanding of the local ecosystem's capacities and limits.

The governance structure itself fosters accountability and adaptability. The customary council is composed of community members who are directly accountable to their peers and who bear the immediate consequences of their decisions (De Barros & Chimeli, 2026). This creates a powerful feedback loop that is absent in distant state bureaucracies. This proximity of governors to the governed and of decisions to their impacts is a crucial reason for the system's effectiveness. The reliance on deliberation and consensus-building (*musyawarah*) in decision-making ensures that management strategies are socially robust and broadly supported.

A fundamental reason for the system's success lies in its underlying ethics and worldview. The Dayak cosmology does not view the forest as a collection of inert resources to be exploited, but as a living, sentient entity populated by spirits and ancestors. This imbues the forest with a sacred value that transcends mere economic calculation (Vannier et al., 2026). This ethical framework creates a powerful moral imperative for conservation that motivates behavior in ways that purely economic or regulatory incentives cannot. The imperative is to

maintain right-relations with the cosmos, and a healthy forest is the physical manifestation of this balance.

In contrast, the failure of the industrial concession model is explained by its complete disconnection from this local context. It operates on a logic of simplification and standardization, imposing a monoculture system that is legible and profitable to distant investors and state agencies but is ecologically and socially devastating (Ziblila et al., 2026). The lack of local accountability, the focus on short-term profit, and the externalization of environmental costs are inherent features, not bugs, of this governance model. It failed because it was designed to maximize a single metric commodity output at the expense of all other ecological and social functions.

Based on these findings, the most critical next step is for the Indonesian government to reform and streamline the legal recognition process for *Hutan Adat*. This involves removing bureaucratic hurdles, providing adequate financial resources to the relevant agencies, and ensuring that the process is accessible and transparent for communities. A national task force should be established to resolve land tenure conflicts between customary territories and existing concessions, using the evidence of effective community conservation as a key criterion in adjudication.

Future research should build upon the findings of this case study. Comparative studies across different Dayak sub-groups and in other parts of the Indonesian archipelago are needed to understand the variability and common principles of indigenous governance systems. Longitudinal research is essential to track the resilience of these systems over time, particularly as they face new pressures from climate change and market integration. Furthermore, research should focus on the internal challenges facing *Hutan Adat*, such as the erosion of traditional knowledge among younger generations and the dynamics of internal community politics.

Conservation organizations and civil society actors have a crucial role to play in translating these findings into action. They should prioritize programs that provide legal and technical support to communities seeking recognition of their customary forests. This includes assistance with participatory mapping, documenting customary laws, and navigating the state bureaucracy. Furthermore, they can help establish networks between communities to share knowledge and strategies for effective forest governance and advocacy, amplifying their collective political voice.

Finally, a paradigm shift is needed in how we approach education and public discourse around conservation. The narrative of "*ignorant*" local communities and "*expert*" outsiders must be actively dismantled. The success of the *Hutan Adat* model should be integrated into university curricula for forestry, environmental science, and public policy. Public awareness campaigns should celebrate indigenous communities as heroes of conservation, highlighting their vital contributions to protecting the planet's biodiversity and climate stability. This shift in narrative is a crucial step toward building the broad societal and political will needed to support indigenous-led conservation at scale.

CONCLUSION

The defining finding of this research is the empirically demonstrated superiority of the Dayak *Hutan Adat* governance system in achieving forest conservation. The striking difference in outcomes an annualized deforestation rate 33 times lower within the customary territory compared to the adjacent industrial concession is not incidental but is the direct result of a sophisticated, culturally embedded institutional framework. This study establishes that the combination of clear spatial zoning, legitimate use-rules grounded in *hukum adat*, and effective community-based monitoring and enforcement constitutes a robust and highly effective model of sustainable management, validating it as a proven, existing solution to deforestation in the region.

This study's primary contribution is both conceptual and methodological. Conceptually, it reframes *Hutan Adat* not as a static cultural artifact but as a dynamic, living governance system capable of successfully navigating complex contemporary pressures, providing a powerful counter-narrative to state-centric conservation paradigms. Methodologically, its value lies in the integration of ethnographic inquiry with quantitative geospatial analysis. This mixed-methods approach enabled the robust triangulation of social and ecological data, moving beyond description to establish a clear causal linkage between specific governance arrangements and tangible conservation outcomes, thus filling a critical gap in the existing literature.

The research's primary limitation is its single-case study design, which, while providing depth, restricts the statistical generalizability of the findings to other indigenous contexts. The unique cultural and historical specificities of the Dayak Iban community may not be fully representative of all indigenous groups in Borneo or beyond. This limitation provides a clear direction for future research, which should prioritize comparative studies across a wider range of customary governance systems to identify common principles and contextual variations. Furthermore, longitudinal studies are urgently needed to assess the long-term resilience and adaptability of these systems in the face of accelerating climate change and increasing market integration pressures.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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