

The Role of Local Communities in Forest Management Based on Local Wisdom: A Qualitative Descriptive Review

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ABSTRAK

Local communities have long functioned as the primary custodians of forests across the Indonesian archipelago and across Southeast Asia and the broader tropics, utilizing accumulated generations of ecological knowledge, customary law, and adaptive social institutions to govern forest resources in ways that modern science is only beginning to fully appreciate. This qualitative descriptive review synthesizes evidence from twenty-three studies—seventeen primary studies drawn from structured literature searches of Indonesian and Southeast Asian community forestry contexts and six foundational international references on traditional ecological knowledge and community-based natural resource governance. Using qualitative content analysis as the primary analytical framework, the review examines four interrelated dimensions of local community involvement in forest management: customary spatial zoning and prohibition systems; traditional ecological knowledge and land management practices; adat (customary) leadership institutions and social capital; and the ecological, socio-cultural, and economic outcomes associated with local wisdom-based forest governance. The synthesis reveals that communities employing complete and culturally embedded local wisdom systems—including sacred grove designations, seasonal harvesting restrictions, and adat sanctions—consistently achieve superior forest conservation outcomes compared to state-managed or externally directed alternatives.

INTRODUCTION

Forests have never been ungoverned. Long before the emergence of modern state forestry bureaucracies, indigenous and local communities across the tropics developed sophisticated systems of forest governance that regulated access, use, and conservation through customary law, spatial zoning, sacred designations, seasonal prohibitions, and community-based monitoring enforced by recognized adat leaders and social sanctions. In Indonesia—home to approximately 17,000 islands, hundreds of distinct ethnic groups, and the third-largest tropical forest estate on the planet—this reality is particularly pronounced. Indigenous communities across Sumatra, Kalimantan, Sulawesi, Maluku, and Papua have maintained functional forest governance systems for generations through what is collectively referred to as kearifan lokal, or local wisdom: the integrated body of knowledge, practices, beliefs, and institutions evolved by a community in its specific

ecological and cultural context (Budiman & Oue, 2025; Afidah et al., 2025; Kissiya & Biczó, 2025).

The theoretical basis for taking local wisdom seriously as a forest governance mechanism has been substantially strengthened by decades of scholarship on common-pool resource governance. Ostrom's (1990) landmark analysis of how communities successfully govern shared resources without either privatization or state control identified a set of design principles—clearly defined boundaries, rules matching local conditions, collective choice arrangements, monitoring, graduated sanctions, conflict resolution mechanisms, recognition of rights to organize, and nested enterprises—that are closely mirrored in the structure of adat forest governance systems documented across the Indonesian archipelago. Berkes (2008), in the authoritative synthesis of traditional ecological knowledge as a governance resource, demonstrated that indigenous knowledge systems are not merely cultural artifacts but adaptive, cumulative, and locally validated bodies of ecological information that often exceed the precision and applicability of externally derived scientific management prescriptions for specific sites and communities.

Despite the theoretical and empirical case for local wisdom-based forest governance, Indonesian state forest policy has historically treated customary forest communities as encroachers in state-designated forest zones rather than as legitimate rights-holders and governance actors. The Constitutional Court Decision No. 35/PUU-X/2012, which recognized the distinction between state forest and customary (adat) forest, represented a landmark legal shift. However, implementation has been slow and uneven, and the gap between formal recognition and practical governance reality remains vast (Novianti et al., 2022; Sandi, 2024; Kissiya & Biczó, 2025). Meanwhile, deforestation, agricultural expansion, mining concessions, and plantation development continue to encroach on community forest territories, undermining both the ecological integrity of forest resources and the social and cultural institutions through which communities have historically governed them (Akmal et al., 2025; Megawati & Mahdiannur, 2021; Isfana et al., 2025).

A growing body of comparative research suggests that community-governed forests often outperform state-managed forests on conservation outcomes when communities possess genuine tenure security, functional adat institutions, and meaningful authority to enforce local rules (Agrawal & Gibson, 1999; Poffenberger, 2006; Ayuttacorn, 2024). Tengö et al. (2014) proposed the Multiple Evidence Base framework as a systematic approach to connecting diverse knowledge systems—including traditional, local, and scientific knowledge—for enhanced ecosystem governance, arguing that neither knowledge system alone is sufficient and that structured dialogue between them produces more robust and legitimate governance outcomes than either can achieve independently. This framework provides the theoretical scaffolding for this review's analysis of how local wisdom and formal forest governance can be productively integrated.

This qualitative descriptive review systematically examines the evidence on local community roles in forest management based on local wisdom across Indonesian and comparable Southeast Asian contexts. The central research questions are: (1) What forms do local wisdom-based forest governance systems take, and how do they function? (2) What are the documented ecological, socio-cultural, and economic outcomes of these systems? (3) What factors threaten the integrity and effectiveness of local wisdom-based governance? And (4) what policy and institutional reforms are necessary to strengthen

and sustain these systems in the face of contemporary pressures? The paper proceeds through a qualitative descriptive methods section, a thematic results and discussion section organized around these questions, and a conclusion with integrative recommendations for policy and research.

METHODOLOGY (Times New Roman, 12, bold, space 1)

2.1 Research Design: Qualitative Descriptive Approach

This review employs a qualitative descriptive research design, which aims to provide a comprehensive, systematic, and richly contextualized synthesis of existing studies on local community roles in forest management through the lens of local wisdom. Qualitative descriptive research is appropriate when the goal is to understand phenomena as they occur in their natural social and cultural contexts, to honor the complexity and particularity of lived experiences and governance practices, and to draw analytical conclusions that are sensitive to variation and context rather than seeking statistical generalization (Sandelowski, 2000). In the context of community forestry and traditional ecological knowledge research, where governance practices are deeply embedded in specific cultural, historical, and ecological contexts that resist reduction to universal metrics, a qualitative descriptive approach allows for a nuanced and faithful rendering of the diversity of local wisdom systems and their outcomes across the sites reviewed.

The analytical method applied to synthesize findings across included studies is qualitative content analysis, which involves the systematic identification, coding, and thematic organization of textual data—in this case, findings reported in the reviewed studies—into interpretive categories that capture patterns of meaning across cases (Hsieh & Shannon, 2005). Codes were developed inductively from the data in the first instance, then organized into higher-order themes reflecting the governance dimensions and outcome categories identified in the reviewed literature. Where studies reported contradictory or divergent findings on a given theme, these tensions were preserved and discussed analytically rather than resolved through averaging or exclusion, consistent with the interpretive orientation of qualitative synthesis.

2.2 Literature Search and Source Selection

The primary literature search was conducted across Scopus, Web of Science, Google Scholar, and Indonesian academic databases including SINTA-indexed journals (Garuda, and institutional repositories). Search terms were constructed in both Indonesian and English and combined three thematic domains: (a) community type and governance context (masyarakat adat, indigenous community, local community, kearifan lokal, local wisdom, adat, customary law); (b) forest type and management (hutan adat, community forest, hutan lindung, forest governance, forest conservation, agroforestry, social forestry); and (c) outcomes and processes (keberlanjutan, sustainability, ecological outcomes, traditional ecological knowledge, land tenure, institutional governance). The search covered studies published from 2000 to 2026, with foundational theoretical references included regardless of publication date. Following title, abstract, and full-text screening, twenty-three sources were retained: seventeen primary empirical or analytical studies from Indonesian and Southeast Asian contexts, and six foundational international references providing theoretical and comparative grounding.

2.3 Inclusion and Exclusion Criteria

Studies were included if they: (a) examined the role of local or indigenous communities in forest management, with explicit attention to traditional practices,

customary institutions, or local ecological knowledge; (b) reported empirical findings from field research (qualitative, quantitative, or mixed methods) or provided systematic analytical synthesis of such findings; (c) were published in peer-reviewed journals, conference proceedings, or peer-reviewed academic books; and (d) were conducted in Indonesia, comparable Southeast Asian contexts, or were globally comparative studies with direct relevance to Indonesian community forestry governance. Studies were excluded if they focused exclusively on plantation management without customary governance dimensions, reported only policy prescriptions without empirical grounding, or were purely technical forestry studies without attention to social or cultural dimensions. Foundational theoretical references by Ostrom (1990), Berkes (2008), Agrawal and Gibson (1999), Tengö et al. (2014), Poffenberger (2006), and Colfer (2011) were included on the basis of their paradigmatic importance to the theoretical frameworks applied in this review, regardless of geographic focus.

2.4 Analytical Framework

Thematic analysis was conducted across four primary analytical dimensions derived from the theoretical literature and the content of included studies: (1) governance mechanisms—the specific forms of customary regulation, spatial zoning, and prohibition systems through which communities govern forest access and use; (2) knowledge systems—the traditional ecological knowledge, species knowledge, and land management practices that communities employ and transmit across generations; (3) institutions and social capital—the adat leadership structures, social norms, and collective action mechanisms that enforce governance rules and sustain community engagement; and (4) outcomes and vulnerabilities—the documented ecological, socio-cultural, and economic results of local wisdom-based governance, and the threats that undermine these systems. This four-dimensional framework draws on Ostrom's (1990) institutional analysis of common-pool resource governance, Berkes's (2008) framework for traditional ecological knowledge, and Tengö et al.'s (2014) Multiple Evidence Base approach.

Table 1. Summary of all twenty-three included studies: location, community/forest type, method, and primary thematic contribution

Author(s) & Year	Location / Community	Method	Primary Theme	Key Finding
Budiman & Oue (2025)	S. Slopes Mt. Slamet, Indonesia	Mixed methods	TEK + climate adaptation	Indigenous knowledge successfully integrated into forest management for climate change adaptation
Akmal et al. (2025)	Liyu Village, S. Kalimantan	Qualitative fieldwork	Climate mitigation practices	Local wisdom practices actively mitigate climate change; drought knowledge, agroforestry systems

Rangkuti et al. (2020)	Gampong Kunci, Aceh Utara		Qualitative descriptive	Social capital + adat	Strong social capital and adat institutions underpin sustainable forest governance in Aceh
Ayuttacorn (2024)	N. Thailand — Karen community		Ethnographic fieldwork	Resilience of indigenous knowledge	Karen community forest management resilient through cultural continuity; TEK critical for resilience
Raihanah et al. (2018)	Pipitak Jaya, Kalimantan	S.	Qualitative case study	Prohibition systems	Local prohibitions (pamali) effectively protect forest zones; adat sanctions maintain compliance
Kissiya & Biczó (2025)	Indonesia (literature review)		Systematic review	TEK governance policy	+ Legal recognition gap prevents full integration of indigenous knowledge into environmental governance
Novianti et al. (2022)	Tigo Luhah Kemantan, Kerinci		Qualitative descriptive	Adat forest zones	Rimbo larangan and hutan simpanan effectively maintained through adat institutions over generations
Afidah et al. (2025)	Indonesia & Malaysia		Comparative review	Empowerment + sustainability	Integration of local wisdom into community empowerment programs improves forest sustainability outcomes

Muhammad Saharuddin (2018)	&	Nagari forests, W. Sumatra	Survey + qualitative	Nagari governance systems	Nagari institution practice diversity supports sustainable forest governance; adat heterogeneity matters
Megawati Mahdiannur (2021)	&	Kajang community, Sulawesi	Case study	Conservation + policy impl.	Ammatoa Kajang local wisdom-based conservation effectively implemented; spiritual sanctions key
Saputra (2020)		Kokoda, Fakfak, W. Papua	Ethnographic	Island conservation systems	Suku Kokoda sasi system provides effective conservation governance on small islands in remote Papua
Isfana et al. (2025)		Batukliang Utara, NTB	Action research	Local wisdom + reforestation	Local wisdom integration in reforestation programs increases community ownership and replanting success
Sagajoka (2025)	& Nona	Detukeli, Ende Regency, NTT	Qualitative descriptive	Ecotourism + conservation	Indigenous ecotourism model based on local wisdom achieves both conservation and livelihood goals
Kaharuddin (2020)	et al.	Indonesia (multi-site)	Mixed methods	Community participation	High local participation in ecotourism governance correlates with better forest conservation outcomes
Sandi (2024)		Papua indigenous peoples	Qualitative analysis	+ policy Papua governance models	Papua indigenous forest management

					offers governance models; policy recognition crucial for scaling
Kartika (2016)	Indonesia multi-case	—	Qualitative comparative	Local leadership roles	Adat leaders are crucial conflict mediators and governance anchors in community forest management
Fatahilah & Hamid (2025)	Haruyan Dayak, HST, Kalsel		Ethnographic	Eco-populism + adat	Eco-populist dynamics in Dayak adat forest governance; community resistance to external encroachment
Ostrom (1990)	Global common-pool resources	—	Institutional analysis	CPR governance design principles	8 design principles for successful community governance of common-pool resources; Nobel Prize framework
Berkes (2008)	Global — TEK synthesis		Book synthesis	Traditional ecological knowledge	Sacred ecology framework: TEK as adaptive, cumulative, and place-based governance resource
Agrawal & Gibson (1999)	Global — natural resource governance		Critical review	Community conservation critique	'Community' concept in conservation is heterogeneous ; social heterogeneity determines governance outcomes
Tengö et al. (2014)	Global — knowledge systems		Conceptual framework	Multiple Evidence Base framework	Connecting diverse knowledge systems (TEK + science) enhances

						ecosystem governance legitimacy and outcomes
r (2006)	Poffenberger	Southeast Asia — community forestry	Regional comparative review	SE Asia community forestry	Community forestry in SE Asia most effective when embedded in customary governance and tenure security	
(2011)	Colfer	Tropical forests — global	Collaborative governance review	Collaborative tropical governance	Collaborative forest governance models require genuine power-sharing with forest communities to succeed	

RESULTS AND DISCUSSION

3.1 Forms of Local Wisdom-Based Forest Governance: Spatial Zoning and Prohibition Systems

One of the most consistent and ecologically significant findings across the reviewed studies is the sophistication of spatial zoning systems through which local communities differentiate forest areas by function, access level, and use intensity. Far from treating forest territories as undifferentiated commons open to unrestricted exploitation, indigenous and local communities across the Indonesian archipelago maintain internally complex zonation systems that regulate which areas may be used, by whom, for what purposes, and in what quantities. These systems constitute a form of spatially explicit adaptive forest management that, in functional terms, closely parallels the zonation approaches advocated by modern conservation biology—but predates and operates independently of those frameworks.

Novianti et al. (2022), studying the Tigo Luhah Kemantan indigenous community in Kerinci, West Sumatra, documented a three-tier forest zonation system comprising the rimbo larangan (strictly prohibited forest, equivalent to a no-take reserve), the hutan simpanan (reserve forest with regulated use for specific community needs), and the production forest zone available for controlled harvesting and agroforestry. This tiered system, maintained over generations through adat law and enforced by community leaders known as Depati, has demonstrably preserved forest integrity in areas where surrounding state-managed forests have experienced significant degradation. Budiman and Oue (2025), investigating the tabet system on the southern slopes of Mount Slamet in Central Java, found a functionally similar zonation in which forested areas in the headwater zones of community water catchments are designated as sacrosanct and subject to the strictest prohibition on any form of extraction—a governance arrangement that simultaneously protects biodiversity and secures water supply for downstream agricultural communities.

Sacred or spiritually designated forest zones—variously referred to as hutan adat, hutan keramat, or equivalent terms in dozens of local languages—appear across virtually every ethnographic context examined in the review, from the Ammatoa Kajang community of South Sulawesi (Megawati & Mahdiannur, 2021) to the Kokoda people of Fakfak in West Papua (Saputra, 2020) and the Dayak communities of South Kalimantan (Fatahilah & Hamid, 2025; Raihanah et al., 2018). These sacred designations function through a dual mechanism: a practical prohibition backed by social sanctions from adat leaders (Kartika, 2016), and a cosmological or spiritual dimension that makes violation a matter of supernatural consequence as well as social stigma. Berkes (2008) identified this integration of spiritual belief systems with resource governance as a universal feature of traditional ecological knowledge systems that dramatically increases compliance without requiring the costly enforcement infrastructure demanded by purely secular governance regimes.

The pamali (taboo), sasi, and pire systems documented across several study sites represent a complementary form of temporal regulation that parallels spatial zoning: by prohibiting harvesting activities during specific seasons, life stages of target species, or designated ceremonial periods, communities effectively create temporal refugia that allow forest resources to recover from use. Saputra (2020) documented the sasi laut and sasi darat systems of the Kokoda people of Ugar Islands in Fakfak as controlling both marine and terrestrial resource extraction through community-wide seasonal closures enforced through adat authority, producing measurable resource recovery in designated areas. Raihanah et al. (2018) recorded similar seasonal restriction systems in Pipitak Jaya, South Kalimantan, where community consensus determines the timing and duration of harvest restrictions for key forest products based on observed ecological indicators—a form of adaptive management rooted in traditional ecological monitoring.

3.2 Traditional Ecological Knowledge as a Forest Governance Resource

The second major theme emerging from the reviewed literature is the depth, sophistication, and practical governance utility of the traditional ecological knowledge (TEK) systems that underpin local wisdom-based forest management. Berkes (2008) defined traditional ecological knowledge as a cumulative body of knowledge, practices, and beliefs about the relationships between living beings—including humans—and their environment, evolving by adaptive processes and handed down through generations by cultural transmission. The studies reviewed across Indonesian contexts richly illustrate how this definition plays out in practice: communities possess detailed, locally validated knowledge of species ecology, hydrological dynamics, soil fertility management, interspecies relationships, and climate indicators that directly inform their forest governance decisions.

Budiman and Oue (2025) documented how the communities of Mount Slamet's southern slopes employ the pranata mangsa—the traditional Javanese agricultural calendar based on astronomical observations and ecological indicators—to coordinate planting, harvesting, and forest management activities with seasonal rainfall patterns and biological cycles in ways that minimize soil disturbance and maintain forest cover during critical erosion-risk periods. This integration of phenological knowledge into land management represents a form of climate adaptation that predates contemporary adaptive management frameworks by centuries. Akmal et al. (2025) similarly documented the rich ethnoecological knowledge of the Banjar community of Liyu Village, Balangan, South Kalimantan, including detailed knowledge of indicator species whose behavioral patterns signal seasonal changes, rainfall forecasts, and optimal planting windows—knowledge

that community members use to time agroforestry management interventions with ecological precision that external extension services cannot replicate at the community scale.

Afidah et al. (2025), in their comparative review of community forest empowerment in Indonesia and Malaysia, found that programs integrating local ecological knowledge into reforestation and restoration design consistently outperformed those imposing externally developed species selections and planting schedules. Communities in both countries possessed validated knowledge of locally adapted native species, microhabitat requirements, and interspecific interactions that improved seedling survival and ecosystem recovery rates when incorporated into program design. This finding aligns with Tengö et al.'s (2014) Multiple Evidence Base framework, which argues that traditional and scientific knowledge systems are not competing but complementary, and that structured integration of both produces governance outcomes that neither can achieve alone. Ayuttacorn (2024), studying the Karen community forestry system in northern Thailand, documented how community ecological knowledge—including detailed forest landscape reading skills, water source identification, and soil quality assessment—enabled community members to identify areas for protection and areas for sustainable use with an accuracy that subsequent scientific surveys confirmed was ecologically well-calibrated.

The knowledge systems documented across these studies are not static. Multiple authors note that traditional ecological knowledge is dynamic and adaptive, incorporating new observations and adjusting prescriptions in response to changing ecological conditions. Isfana et al. (2025), studying a reforestation program in the protected forest of Batukliang Utara, North Lombok, found that community members were actively blending traditional knowledge of local plant species and planting techniques with information from extension workers and NGO partners to develop hybrid approaches that outperformed purely external or purely traditional prescriptions. This adaptive quality—the capacity of traditional knowledge systems to incorporate new information while maintaining their core governance logic—is precisely what Berkes (2008) identifies as the hallmark of living traditional ecological knowledge systems, distinguishing them from museum-piece cultural artifacts.

3.3 Adat Institutions and Social Capital as Governance Infrastructure

The third analytical dimension concerns the institutional infrastructure through which local wisdom-based forest governance is organized, enforced, and sustained across generations. Across all seventeen primary studies reviewed, the presence of functional adat institutions—recognized customary leadership structures with the authority to make, communicate, and enforce community forest governance rules—emerges as the single most important determinant of effective local wisdom-based forest management outcomes. This finding is entirely consistent with Ostrom's (1990) institutional analysis of common-pool resource governance, which identified the presence of recognized governance authorities with enforcement capacity as one of the eight core design principles for successful community resource management. Where adat institutions are strong, recognized, and integrated into community daily life, forest governance outcomes are consistently superior to contexts where they have been weakened by state encroachment, internal social fragmentation, or legal non-recognition.

The diversity of adat leadership roles documented across the reviewed studies reflects the cultural richness of Indonesian indigenous governance traditions: the Depati in Kerinci (Novianti et al., 2022), the Ammatoa in Kajang (Megawati & Mahdiannur,

2021), the Pawang Glee and Kejrueen Glee in Aceh (Rangkuti et al., 2020), the Mosalaki in Flores (Sagajoka & Nona, 2025), and the various forms of customary leadership in Dayak communities (Fatahilah & Hamid, 2025; Raihanah et al., 2018) all function as what Kartika (2016) terms 'local leaders as solutions'—individuals whose authority to adjudicate disputes, impose sanctions, coordinate collective action, and represent community interests to external parties is the linchpin of effective forest governance. The legitimacy of these leaders derives not from formal state appointment but from customary law, community recognition, and the perceived alignment of their decisions with community values—a form of social legitimacy that, as Agrawal and Gibson (1999) argue, is both more durable and more effective in promoting conservation compliance than externally imposed authority.

Gotong royong—the deeply embedded Indonesian cultural practice of community cooperation and mutual aid—functions as both a governance mechanism and a form of social capital that sustains collective action for forest management. Isfana et al. (2025) documented how gotong royong norms in Batukliang Utara organized voluntary labor contributions for reforestation activities that would have been unaffordable through formal contracted labor, and whose quality was higher because community members brought local knowledge and personal investment to the work. Kaharuddin et al. (2020), studying community participation in ecotourism development across multiple Indonesian sites, found that communities with strong gotong royong traditions achieved significantly higher participation rates in forest-based ecotourism governance, leading to more equitable benefit distribution and more robust conservation outcomes than externally managed tourism operations. Ayuttacorn (2024) identified equivalent community solidarity mechanisms among the Karen of Thailand as the social foundation upon which the resilience of their community forestry system was built, enabling them to collectively resist external encroachment pressures that had displaced other forest communities in the region.

Poffenberger (2006), in his comparative analysis of community forestry experiences across Southeast Asia, identified secure customary tenure as the foundational prerequisite for all other governance mechanisms to function effectively. Without confident, legally recognized, and practically defensible community rights over their forest territories, communities lack the incentive to invest in long-term governance, cannot enforce exclusion of external encroachers, and are vulnerable to the appropriation of governance gains by powerful external interests. This finding resonates across the Indonesian studies reviewed: in contexts where community tenure is legally recognized—even imperfectly—governance outcomes are substantially better than in contexts where communities manage forests to which they lack formal rights (Sandi, 2024; Kissiya & Biczó, 2025; Novianti et al., 2022).

Table 2. Documented outcomes of local wisdom-based forest governance across reviewed studies, by dimension

Outcome Dimension	Indicator	Representative Finding	Key Sources
Ecological	Forest cover conservation	Adat forests maintain higher cover than adjacent state-managed zones	Budiman & Oue (2025); Novianti et al. (2022); Muhammad & Saharuddin (2018); Megawati & Mahdiannur (2021); Saputra (2020)
Ecological	Biodiversity retention	Sacred grove communities harbor higher species	Budiman & Oue (2025); Afidah et al. (2025); Ayuttacorn (2024); Berkes (2008); Poffenberger (2006)

			richness than production zones	
Ecological	Watershed protection		Headwater zone prohibitions maintain dry-season flow and water quality	Budiman & Oue (2025); Isfana et al. (2025); Akmal et al. (2025); Yuliani & Aprilina (2020)
Socio-cultural	Identity & cultural continuity		Forest governance reinforces cultural identity and intergenerational knowledge transfer	Megawati & Mahdiannur (2021); Fatahilah & Hamid (2025); Rangkuti et al. (2020); Afidah et al. (2025)
Socio-cultural	Social cohesion		Gotong royong and adat norms strengthen social solidarity around forest governance	Rangkuti et al. (2020); Isfana et al. (2025); Kaharuddin et al. (2020); Ostrom (1990)
Economic	Livelihood diversification		Agroforestry + ecotourism provide sustainable income without depleting forest resources	Sagajoka & Nona (2025); Kaharuddin et al. (2020); Afidah et al. (2025); Ayuttacorn (2024)
Economic	PES and carbon finance		Communities with recognized tenure can access PES and carbon market instruments	Isfana et al. (2025); Afidah et al. (2025); Kissiya & Biczó (2025); Colfer (2011)

3.4 Threats to Local Wisdom-Based Forest Governance Systems

Despite the compelling evidence of local wisdom-based governance effectiveness, the reviewed literature consistently documents a convergent set of threats that erode these systems, sometimes rapidly and in ways that are difficult to reverse. The four most consistently identified threat categories are: legal non-recognition of customary forest rights; penetration of market economies that reconfigure individual incentives away from collective governance; weakening of adat authority through generational change and out-migration; and direct encroachment by state-sanctioned extractive industries and plantation enterprises.

Legal non-recognition of indigenous forest rights is the foundational vulnerability that enables all other threats. Where communities do not possess legally recognized, formally documented, and practically defensible rights over their forest territories, they lack the standing to exclude outside encroachers, the security to invest in long-term governance, and the leverage to seek state protection when those territories are threatened by commercial interests. Kissiya and Biczó (2025), in their review of indigenous knowledge and environmental governance in Indonesia, found that the gap between formal recognition of customary rights in Indonesian law—including the Constitutional Court Decision No. 35/PUU-X/2012—and practical implementation at the village and district level remains vast, with most indigenous communities still lacking the formal documentation needed to operationalize their customary rights against competing claims from plantation companies and mining concessions. Sandi (2024) documented this gap specifically in Papua, where indigenous land rights claims are frequently overridden by national development projects without adequate free, prior, and informed consent processes.

Modernization—including improved market access, increased formal education, and the penetration of cash economies into previously subsistence-oriented communities—transforms the incentive structures that sustain adat governance compliance. Muhammad and Saharuddin (2018), studying nagari forest governance in West Sumatra, found that communities with greater market integration showed lower adat compliance rates and higher rates of unauthorized forest conversion, reflecting the increased opportunity cost of adhering to collective governance restrictions when individual market incomes are available as alternatives. Afidah et al. (2025) identified this dynamic across both Indonesian and Malaysian community forestry contexts, noting that modernization does not automatically undermine local wisdom but creates a vulnerability that is only avoidable where communities retain strong cultural identity, are economically compensated for conservation services (through PES or ecotourism), and where adat governance adapts its rules to changing incentive structures rather than rigidly maintaining systems that no longer fit community livelihoods. Tengö et al. (2014) similarly argued that TEK systems that fail to adapt to changed ecological and social conditions become brittle and eventually collapse, while adaptive systems that continuously integrate new information and experiences remain robust.

Colfer (2011), in her synthesis of collaborative tropical forest governance, identified the absence of genuine power-sharing between state forestry agencies and local communities as the systemic governance failure underlying the persistent underperformance of nominally collaborative forest management arrangements. Where collaboration is structured to co-opt community labor and local knowledge as inputs into state-defined management objectives—without meaningfully delegating decision-making authority, resource rights, or benefit flows to communities—the result is neither effective conservation nor equitable governance. The local wisdom systems reviewed in this study represent precisely the governance alternative that Colfer's framework identifies as most likely to achieve both: genuine community authority, embedded in cultural legitimacy, aligned with collective interest, and enforced through social mechanisms that are more effective and less costly than state enforcement.

Table 3. Framework of governance mechanisms, enabling conditions, threats, and policy recommendations for local wisdom-based forest management

Governance Dimension	Key Enabling Conditions	Principal Threat Mechanisms	Priority Policy & Research Recommendations
Spatial zoning & prohibition	Recognized sacred designations; adat authority over zone definitions; community consensus	Tenure insecurity; land conversion pressure; weakening of spiritual sanction mechanisms	Legal mapping and formal recognition of customary forest zones; support adat spatial planning processes
Traditional ecological knowledge	Active intergenerational transmission; adaptive capacity; community validation processes	Formal education disconnect; out-migration of knowledge holders; devaluation of TEK by state agencies	Document and co-produce TEK with communities; integrate into curriculum and extension; fund TEK holders as governance specialists
Adat institutions & leadership	Recognized legitimate leaders; functional	Generational leadership gaps; state non-	Formal recognition of adat leaders in multi-level forest governance; support adat institution capacity-building

	sanctions; integration with state governance tiers	recognition; capture of governance	elite adat programs
Social capital & collective action	Gotong royong norms; shared identity; equitable benefit distribution mechanisms	Market individualization; social stratification; inequitable PES/ecotourism benefit flows	Design PES and ecotourism programs through community governance structures; ensure equitable benefit flows reinforce collective governance
Legal tenure & rights recognition	Formal adat forest mapping and legal documentation; FPIC compliance; recognized customary territorial rights	Non-implementation of Constitutional Court Decision 35; overlapping concession claims; bureaucratic complexity	Accelerate hutan adat recognition process; streamline administrative pathway; establish independent monitoring of compliance

3.5 Integration of Local and Scientific Knowledge: The Multiple Evidence Base Imperative

A cross-cutting finding that unifies the evidence across all reviewed studies is that the most effective and durable forest governance outcomes are achieved not when local wisdom systems are treated as alternatives to scientific management or state governance, but when they are structurally integrated with them as equal and complementary sources of knowledge and authority. Tengö et al.'s (2014) Multiple Evidence Base framework provides the most rigorous theoretical scaffolding for this integration: rather than merely validating traditional knowledge through a scientific filter or incorporating scientific data as a corrective to 'deficient' traditional knowledge, the framework calls for genuine epistemic pluralism in which knowledge claims from traditional, local, and scientific sources are evaluated through their own internal standards of validation and then brought into structured dialogue to inform governance decisions.

Budiman and Oue (2025), working with communities on Mount Slamet's southern slopes, demonstrated a practical model of this integration: community knowledge of forest water relationships and seasonal dynamics was systematically documented alongside scientific measurements of soil moisture, runoff, and species distribution, and the two knowledge streams were used jointly to develop a community forest management plan that achieved better ecological targeting than either approach alone. The process itself—of structured dialogue between knowledge systems—also strengthened community ownership of the resulting governance plan, because communities recognized their own knowledge as foundational rather than supplementary. Isfana et al. (2025) reported a similar outcome in North Lombok, where the integration of local species knowledge into a reforestation program led by an external NGO substantially improved seedling survival and forest canopy recovery rates compared to the NGO's prior purely externally designed planting programs.

Ayuttacorn (2024) demonstrated that the resilience of the Karen community forestry system in northern Thailand derives in large part from the community's capacity to selectively incorporate external knowledge and policy opportunities—including formal protected area designations and payment for ecosystem services mechanisms—into their existing governance framework in ways that strengthen rather than displace their

customary institutions. This selective integration, guided by community deliberation within functioning adat governance structures, is precisely the adaptive quality that Berkes (2008) identifies as the hallmark of living traditional ecological knowledge systems and that Poffenberger (2006) identifies as the key to the long-term viability of community forestry arrangements in Southeast Asia.

CONCLUSION

This qualitative descriptive review synthesizes evidence from twenty-three studies to examine the role of local communities in forest management based on local wisdom across Indonesian and Southeast Asian contexts. The findings confirm that local communities are not peripheral stakeholders in forest governance but central actors whose accumulated ecological knowledge, customary spatial governance systems, adat institutions, and social capital collectively constitute a sophisticated and largely effective forest governance infrastructure that has maintained forest integrity across generations in many parts of the Indonesian archipelago.

The review identifies four principal dimensions of local wisdom-based forest governance—spatial zoning and prohibition systems, traditional ecological knowledge, adat institutions and social capital, and the ecological, socio-cultural, and economic outcomes these dimensions produce—and documents through qualitative synthesis that each dimension contributes distinctively and interdependently to governance effectiveness. Sacred forest designations and seasonal restriction systems create resource recovery refugia; traditional ecological knowledge enables ecologically informed and locally adapted management; adat leadership and gotong royong norms sustain compliance and collective action without costly external enforcement; and the resulting governance systems deliver demonstrably superior conservation outcomes, while simultaneously supporting cultural identity, social cohesion, and livelihood diversification for participating communities.

Against these documented strengths, the review also identifies a convergent set of threats that erode local wisdom-based governance systems: legal non-recognition of indigenous forest rights, market-driven individualization of incentive structures, generational weakening of adat authority, and direct encroachment by state-sanctioned commercial interests. These threats are structural and systemic, not incidental, and they require structural and systemic policy responses. Most fundamentally, the acceleration of legal recognition of customary forest rights—including the full implementation of Constitutional Court Decision No. 35/PUU-X/2012—is an indispensable prerequisite for preserving the conditions under which local wisdom-based governance can function.

Drawing on the theoretical frameworks of Ostrom (1990), Berkes (2008), Agrawal and Gibson (1999), Tengö et al. (2014), Poffenberger (2006), and Colfer (2011), this review concludes with the recommendation that Indonesian forest policy adopt a genuine co-governance model that treats adat institutions as primary governance actors, integrates traditional ecological knowledge as a co-equal input into forest management planning, and designs benefit-sharing mechanisms that reinforce rather than undermine collective governance norms. Research priorities include longitudinal studies tracking the effects of legal recognition on governance outcomes, comparative analyses of governance resilience across different adat systems under modernization pressure, and methodological development for community-controlled

traditional ecological knowledge documentation that respects community intellectual property rights while enabling policy integration. The evidence is clear: sustaining the vital forest governance functions of local communities through authentic recognition, institutional support, and knowledge integration is among the highest-leverage interventions available for achieving Indonesia's forest conservation and climate commitments.

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