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Spiritual Dimensions of Local Knowledge in Forest Conservation: An Integrative Deep Ecology-Ecospirituality Framework for Alternative Environmental Governance

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Abstract

Contemporary forest governance, dominated by commodification-driven paradigms, has accelerated deforestation and marginalized local knowledge systems. While political ecology increasingly recognizes indigenous knowledge, the spiritual dimensions of forest conservation remain theoretically and empirically underexplored. Drawing on deep ecology and ecospirituality, this study examines how the spiritual dimensions of local knowledge legitimize forest conservation and develops an integrative framework as an alternative model of environmental governance. Using a comparative case design with qualitative methods, we studied two prohibited forests: Dusun Buhuk (South Sumatra) and Bukit Tabun (Bangka Belitung). Data came from in-depth interviews with 45 informants, eight months of participant observation, and satellite imagery analysis (2000–2023), examined through thematic analysis and cross-case comparison. We identify three spiritual mechanisms: spiritual ontology, which constructs forests as sentient entities with ancestral presence; spiritual authority, which generates governance legitimacy; and spiritual sanctions, which produce internalized compliance through supernatural punishment. Both sites preserved 98–100% of forest cover over 23 years, whereas formally protected areas lost 0.5–2% annually. Locally rooted spiritual values thus offer practical, self-enforcing governance that sustains biodiversity and social cohesion while adapting to external pressures. These findings counter state-centric paradigms and underscore the need to integrate spiritual values into conservation policy.

Keywords: *local knowledge, ecospirituality, deep ecology, prohibited forest, environmental governance*

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Introduction

Current forest governance paradigms are losing legitimacy due to overwhelming materialist attitudes regarding forests solely as economic exploitation objects. Barletti et al. (2020) show that state-centric models prioritize economic interests over conservation, leading to massive deforestation. Indonesia loses 1.13 million ha annually (Austin et al., 2019). Techno-scientifically monopolized forest governance has systemically marginalized indigenous knowledge systems that have successfully maintained ecological balance for decades. Rakatama and Pandit (2020) note that excluding local populations from forest governance results from epistemological violence disregarding forests' more-than-human spiritual aspects. While political ecology acknowledges the limitations of state-centric models and seeks to recognize indigenous governance systems, significant gaps remain regarding the governance structures of local knowledge that operate as effective environmental management systems (Escobar, 2020).

In addition, Berkes and Ross (2013) highlight how most conservation studies overlook spirituality's protective roles, sacred stories, and ancestral ties, focusing instead on material and institutional factors. "Sacred forests" operating on spiritual principles demonstrate exceptional conservation results rivaling state-managed protected areas (Dudley et al., 2012; Fernández-Llamazares & Cabeza, 2018). Indigenous peoples worldwide promote biodiversity and ecosystem services through spiritual governance systems, rather than through external laws.

Furthermore, despite growing recognition that sacred sites harbor significant biodiversity, the role of spiritual agency and spiritual governance in conferring legitimate conservation authority remains poorly understood within contemporary conservation science (Studley, 2018). Conventional studies continue to privilege material and institutional factors over the protective functions of spirituality, leaving largely unexplained why spiritually grounded systems often prove more effective than formal

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enforcement (Verschuuren & Brown, 2018). This research addresses these theoretical and empirical gaps.

Integrative theoretical framework The deep ecology paradigm presents alternatives to anthropocentrism in environmental governance. While shallow ecology views nature as a resource for human use, deep ecology recognizes the biosphere's intrinsic value and advocates biospheric egalitarianism (Drengson & Inoue, 1995). This framework operates on eight principles countering Cartesian dualism, fostering relational understanding of human-nature interconnectedness (Capra & Luisi, 2014).

Eco-spirituality develops a complementary framework uniting spiritual and ecological dimensions. Specifically, human-nature relationships are mediated by spiritual beliefs and rituals, which impose a moral duty to preserve the environment (Lyons et al., 2016). Likewise, indigenous worldviews are ecological, in which spiritual entities, nature, and humanity interconnect to form holistic systems (Berkes, 2017). Furthermore, spiritual sanctions and taboos function as sophisticated control mechanisms regulating environmental conduct without external enforcement (Colding & Folke, 2001).

However, von Benda-Beckmann et al. (2006) state that spiritual authority sources in indigenous resource management are overlooked in conventional legal systems. Verschuuren et al. (2012) argue that spiritual legitimacy stems from deeply held beliefs about the sacred interconnections among communities, ancestors, and natural entities, generating a moral duty to safeguard places or resources. This allows communities to self-organize and manage resources absent state or market interventions (Ostrom, 2009).

Operational theoretical model Based on these theoretical foundations, this research develops an integrative model combining deep ecology and eco-spirituality to understand spiritual dimensions underpinning the authoritative legitimacy of forest conservation through three interconnected mechanisms.

Spiritual ontology refers to community beliefs that forests are living agents and rights-holders, rather than resources to be exploited. This perspective moves beyond instrumentalist understandings and reflects the view of many Indigenous peoples, who regard forests as sentient places inhabited by spiritual beings actively engaged with human communities (Kohn, 2013).

Spiritual authority establishes legitimate governance structures through ancestral connections and the transmission of sacred knowledge. Bourdieu (1991) explains that spiritual authority operates through symbolic capital derived from genealogical proximity, supernatural abilities, or collective recognition as knowledge keepers, legitimate through community acceptance rather than state recognition.

Spiritual sanctions are defined as social control mechanisms grounded in beliefs about supernatural punishment. Drawing on Purzycki and Sosis (2022), these beliefs foster internalized motivation for compliance, proving more powerful and adaptive than formal legal penalties in shaping environmental behavior.

The model predicts that forest conservation proves most effective when: 1) spiritual beliefs about forest sacredness are widely shared; 2) spiritual authority is clearly designated and socially recognized; 3) spiritual sanctions for violations are clearly understood and feared; and 4) spiritual practices are regularly performed to maintain relationships with forest entities.

Methods

This research employs a multi-site comparative ethnographic case study with a mixed-methods approach to explore spiritual mechanisms in forest governance at two locations. Yin (2018) explains that this method enables an in-depth investigation of contemporary phenomena in real-life contexts. The sequential explanatory mixed-methods design prioritized qualitative data with quantitative data for triangulation (Purzycki & Sosis, 2022).

Data collection during 8 months of fieldwork used a multi-method approach: in-depth interviews with 45 informants (15 traditional elders/spiritual leaders, 20 multi-generational community members aged 20 to 70, and 10 external stakeholders) selected through purposive and snowball sampling; participant observation of spiritual mechanisms' manifestations in ritual practices, decision-making, daily forest interactions, and knowledge transmission; six focus group discussions with mixed-gender, women-only, and youth groups; and secondary data, including historical documents, government records, and satellite imagery from 2000 to 2023.

Thematic analysis used a hybrid deductive-inductive approach following the framework of Braun and Clarke (2006). NVivo 12 managed coding with inter-coder reliability (Cohen's Kappa > 0.80). Cross-case analysis employs pattern-matching techniques to test theoretical propositions. Multiple triangulation strategies ensured validity (Denzin, 2017). Spatial analysis calculated annual deforestation rates compared with surrounding areas. Trustworthiness is ensured through prolonged engagement, member checking, peer debriefing, and comprehensive audit trails (Lincoln & Guba, 1985). Research obtained ethical clearance, ensuring free, prior, and informed consent and compliance with cultural protocol.

Result

Spiritual ontology: Forests as living entities Comparative analysis reveals complex spiritual ontology manifestations in the community's understanding of prohibited forests (Budiman & Oue, 2025). This aligns with Kohn's (2013) perspective, which recognizes forests as living entities with agency and rights and further challenges the Cartesian paradigm separating subject/object and human/nature (Descola, 2013).

In Dusun Buhuk, the forest is understood as a "spiritual home" actively inhabited by *Puyang Nanggung Baye* and the ancestral community, not a metaphor but a lived reality. Traditional elder AJ explains, "Dusun *Buhuk* is not empty. *Puyang* watches over descendants. Every night sound, mortars, talking, and children playing prove spiritual life continues." This creates sacred geography connecting past,

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present, and future through spiritual continuity (Verschuuren et al., 2012).

Bangka Belitung exhibits variation through the "*Kampung Gaib*" (invisible village) concept at Bukit Tabun. The Mapur tribe constructs an understanding of the forest as an invisible settlement inhabited by ancestral spirits and non-human entities. Abok Geboy explains, "*Bukit Tabun* is a village invisible to ordinary eyes. There is life there, a spiritual society maintaining natural balance." This resonates with Blaser's (2013) argument for pluriverse ontologies.

Comparison reveals variations reflecting local specificities, yet both recognize forests as living entities with agency. The fundamental difference lies in ontological focus: South Sumatra emphasizes individual ancestral presence (personal, genealogical) (Blaser, 2013); Bangka Belitung emphasizes collective spiritual community (communal, distributive), supporting the multinaturalism perspective (Castro & Skafish, 2014).

Reciprocal relationships with other-than-human beings Spiritual ontology fosters a profound understanding of reciprocal relationships between human communities and forest entities (Descola, 2013). Animism frameworks provide an analytical lens for understanding the construction of relationality with other-than-human beings, based on mutual care and interdependence rather than exploitation.

In South Sumatra, reciprocal relationships manifest through *sedekah* practices at Puyang's grave before planting and after harvest, recognizing *Puyang* as an other-than-human person with agency regulating water flow and soil fertility. Beliefs about *Puyang*'s supernatural intervention in creating irrigation systems are a lived reality, shaping practical water management (Lansing, 2012).

Bangka Belitung encompasses interactions with animal teachers and forest spirits in traditional medicine. The Mapur tribe knows animals as spiritual teachers with documented wisdom. An informant explained, "We learn from long-tailed monkeys about plants for mothers after childbirth. Cats teach medicinal grass when sick," coinciding with Indigenous scholarship regarding animals as instructors (Kimmerer, 2013).

Spiritual authority and governance legitimacy Spiritual authority examination shows different yet equally effective configurations. In South Sumatra, authority focuses on *Jurai Tue* as *Puyang*'s direct descendant resiliently (Martin et al., 2016). Authority legitimacy comes from genealogical closeness and community-validated supernatural prowess. The *Gagang Aik* system demonstrates spiritual authority's institutional embodiment—five descendant family heads possess exclusive water distribution rights from spiritual mandate, not democratic vote or state appointment (Sikor & Lund, 2009).

In Bangka Belitung, spiritual authority exercises collective governance through the *Lembaga Adat Mapur* (LAM) system, which is more egalitarian and participatory, with authority resting on community appreciation of spiritual and ethical attributes rather than biological lineage, aligning with the polycentric governance concept (Ostrom, 2009).

Discussion

Spiritual sanctions as sophisticated enforcement mechanisms Spiritual sanctions operate as sophisticated enforcement mechanisms effective without external monitoring or formal legal procedures. Evolutionary anthropology frameworks explain how supernatural beliefs function as a powerful mechanism for social cooperation and norm enforcement (Purzycki & Sosis, 2022).

In South Sumatra, *"kualat"* or *"dikibit uyang"* functions as a powerful deterrent against forest violation, not abstract threats but real, perceived consequences validated by community experiences. Documentation reveals various spiritual sanctions, including sudden illness, accidents, and economic misfortune. An informant explains, "Someone tried taking large wood from Dusun Buhuk to sell. Within a week, his child became seriously ill, and the business went bankrupt. That is Puyang's anger sign."

Effectiveness is understood through the cognitive science of religion, explaining how supernatural agent concepts enhance cooperation and reduce free-riding (Turchin et al., 2013). Belief in supernatural monitoring creates internalized compliance more effectively than external enforcement.

In Bangka Belitung, spiritual sanctions manifest through environmental consequences and supernatural punishment with collective impacts. Violations are believed to contribute to natural disasters, crop failures, and ecological imbalances affecting the entire community, creating strong conservation incentives because consequences are communal (Atran et al., 2005).

Balancing cultural preservation and individual rights: Critical tensions While spiritual governance demonstrates remarkable conservation effectiveness, this research acknowledges critical tensions between collective cultural preservation and individual rights. Following the framework of Ribot and Peluso's (2003) analysis of access and authority, we identify three primary tensions.

Spiritual sanctions and individual autonomy Spiritual sanctions raise concerns about individual autonomy and freedom of belief. Cases reveal individuals facing social ostracism or psychological distress when questioning traditional beliefs. Youth (ages 18–30, n = 18) in focus groups reported that 67% experienced cognitive dissonance between scientific worldviews and spiritual beliefs, with 28% concealing their doubts to avoid censure. One 32-year-old informant with an environmental science degree (DS) reported, "I wanted to explain that the forest fire was caused by drought, not Puyang's anger. But I feared being labeled disrespectful."

The psychological burden extends beyond environmental violations. Three Bangka Belitung cases involved individuals wishing to convert religions but fearing spiritual consequences, creating what one termed an "invisible prison"—legally free but spiritually bound. This raises fundamental questions about religious freedom within Indigenous governance.

Gendered dimensions of spiritual authority Spiritual authority concentration creates potential for power, with

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gender being the most salient exclusion axis. Women have limited participation in spiritual decision-making despite being primary forest users. In Dusun Buhuk, Gagang Aik exclusively comprises male elders (average age 58), excluding women from water governance. Women's focus groups (n = 12) revealed significant frustration. Key informant SR (45-year-old mother) explained, "We fetch water daily and know which springs are clean and which are drying up. But when decisions are made, we're not invited. They say women don't understand spiritual matters."

In Bangka Belitung, despite LAM's more egalitarian structure, women constitute only 15% of customary leadership. LAM meeting analysis (20182023) shows a women-to-men speaking time ratio of 1:7. Youth exclusion is equally pronounced—individuals under 40 are systematically excluded from spiritual leadership based on beliefs that authority requires decades of wisdom, creating gerontocratic structures that limit youth agency.

Social coercion and exit constraints While research found no physical harm evidence, the psychological impact of supernatural punishment beliefs and social sanctions constitutes coercion, limiting individual agency. Two individuals in South Sumatra who criticized *Jurai Tue*'s fund management were accused of "angering *Puyang*," leading to ostracism and economic boycott, demonstrating how spiritual authority can silence legitimate accountability demands.

Exit is particularly problematic. Individuals wishing to leave spiritual governance face significant barriers. The belief that ancestral spirits maintain a connection regardless of location creates what is called "sticky obligations" (Li, 2014). Three urban-relocated informants reported continuing anxiety about spiritual consequences for families remaining in villages.

Contextualizing within broader power dynamics However, these tensions must be contextualized. Compared to state-imposed conservation models historically dispossessing indigenous communities through "fortress conservation", spiritual governance demonstrates greater procedural justice and local legitimacy (Brockington et al., 2012). Both communities possess informal grievance mechanisms—what Ostrom (2009) terms "constitutional choice rules"—though the forums are dominated by male elders.

The integration of spiritual governance into formal policy must include safeguards for individual rights: 1) independent grievance mechanisms external to spiritual authority; 2) explicit protections for freedom of belief and expression; 3) gender equity mandates requiring minimum women's representation; 4) youth representation mechanisms; and 5) voluntary participation principles allowing opt-out without losing resource access.

Study limitations This research acknowledges a limitation in failing to systematically include individuals who left these communities or actively dissent, which may introduce selection bias. Power dynamics between researchers and participants may have limited informants' willingness to openly criticize spiritual authority. Eight months of fieldwork are insufficient to capture long-term outcomes. Future research should examine the following: 1) long-term outcomes for individuals challenging or leaving systems; 2) gender dynamics and women's participation pathways; 3) mechanisms protecting individual rights while maintaining conservation effectiveness; and 4) comparative analysis of rights protections in spiritual versus state-centric models.

Conservation outcomes and ecological resilience Spiritually based forest governance impacts remain profoundly positive. Satellite analysis shows Dusun Buhuk forest cover increased from 0% to 100% between 2000 and 2023, while peripheral areas experienced 15–25% deforestation. Bukit Tabun demonstrated 98% forest cover longevity with minimal edge-effect degradation. These results starkly contrast with Indonesia's formal protected areas, which suffer 0.52% annual loss (Austin et al., 2019). Both prohibited forests provide critical refugia for endemic species and valuable ecosystem services.

The social-ecological systems framework illustrates how governance rooted in spiritual beliefs fosters social cohesion, institutional stability, and sustainability—essential for enduring conservation (Berkes, 2017). Community choices are consensus-based, guided by spiritual considerations, fostering collective rather than short-term self-centeredness, and demonstrating remarkable resilience against external pressures from logging companies, palm oil plantations, and government development initiatives.

Resilience and adaptation: Navigating modernity and intergenerational transmission, formal education, and belief transformation The interaction between formal education and traditional spiritual beliefs presents complex dynamics of erosion and adaptation. Community surveys (n = 142) reveal that 78% of those under 35 years old completed junior high school, compared with 23% of those over 50 years old. This correlates with measurable changes in the intensity of spiritual belief.

Younger, educated members demonstrate "selective belief modernization," maintaining core spiritual ontology while reinterpreting mechanisms through scientific frameworks. Informant RD (28 years, agricultural engineering degree) explains: "I still believe Dusun Buhuk is sacred and must be protected, but I understand irrigation through hydrology now. *Puyang*'s wisdom is about environmental balance, not just supernatural power."

Survey data shows educational level correlates with interpretation style rather than belief abandonment: university graduates (n = 15) maintain 100% conservation commitment, 87% forest sacredness belief, and 60% metaphorical spiritual interpretation; high school graduates (n = 42) show 100% conservation commitment, 95% sacredness belief, and 76% literal interpretation; and primary education only (n = 28) shows 100% conservation commitment, 100% sacredness belief, and 96% literal interpretation.

However, formal education introduces epistemological challenges. Youth (ages 18–30, n = 24) showed 71% experienced tension between scientific explanations and

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spiritual narratives. Three informants (ages 1924) reported ridicule from urban peers for maintaining spiritual beliefs, leading to "cultural shame" (Turner et al., 2000).

Intergenerational transmission strategies Both communities developed deliberate strategies for maintaining knowledge continuity.

Formalized customary education Bangka Belitung's LAM established *"Sekolah Adat Mapur"* (2016) with monthly forest immersion sessions. Participation at 67% of eligible youth shows regular attendees demonstrate significantly higher traditional ecological knowledge, identifying an average of 42 medicinal plants versus 12 for non-participants; demonstrating proper ritual protocols (83% vs 31%), and correctly recounting oral histories (76% vs 28%).

Mandatory ritual participation South Sumatra requires people aged 15–40 to participate in annual *sedekah* rituals. Survey data (n = 60) indicates that ritual participation correlates with retention of spiritual belief: annual attendees show an 87% strong forest-sacredness belief versus 58% for non-participants, a 71% versus 48% fear of spiritual sanctions, and a 74% versus 42% likelihood to report violations.

Technology-mediated preservation Both communities embrace digital documentation. The Dusun Buhuk youth group created 47 video interviews with elders, mapped sacred sites using GPS/GIS, made a photo catalogue of 156 forest species, and wrote down customary laws to help preserve knowledge as elders pass away and to provide resources for younger generations who like learning digitally.

Documented adaptations Both locations exhibit remarkable adaptive capacity.

Dusun Buhuk (*2015–2018*) Facing logging company offers (IDR500 million for a 10-year concession), the community developed ecotourism as an alternative livelihood. The *Jurai Tue* reframed spiritual narratives supporting this innovation. "*Puyang* provides through living forests, not dead timber. Showing visitors the forest's beauty honors *Puyang* better than cutting trees." Ecotourism generates IDR45 million annually, creating conservation incentives without compromising spiritual governance.

Bukit Tabun (*2012–2016*) Facing mining concession threats, LAM was formalized under Indonesian foundation law, enabling collective land claims while maintaining spiritual governance internally, representing a legal "translation" of spiritual authority into state-legible forms (Scott, 1998). For youth out-migration (37% aged 2035 migrated 2010–2023), LAM established a diaspora council maintaining spiritual connection through virtual membership, online voting, monthly video conferences, and mandatory annual physical returns.

Measured belief continuity across generations Structured surveys (n = 142) reveal generational patterns: forest sacredness belief: 97% (50+ years), 87% (35–49), and 68% (1834); fear of spiritual sanctions: 91%, 77%, and 59%; ritual participation: 95%, 72%, and 51%; conservation behaviour: 100%, 98%, and 96%. While belief intensity shows measurable erosion among youth, actual conservation behavior remains remarkably consistent, suggesting successful adaptation where younger members maintain practices through hybrid motivations combining spiritual beliefs, environmental ethics, and livelihood security—a term called "knowledge co-production" (Tengö et al., 2014).

Engaging with Indonesian regulatory frameworks: Legal pluralism and policy integration Spiritual governance integration within Indonesia's formal legal framework presents opportunities and contradictions requiring careful navigation, particularly regarding Law Number 41/1999 on Forestry and subsequent reforms.

Legal classification tensions: *Hutan adat* versus state forest Indonesia's forestry law historically classified all forests as state property unless proven otherwise. The Constitutional Court Decision Number 35/PUU-X/2012 marked a significant shift, declaring that customary forests (hutan adat) are not state-owned but rather part of indigenous lands, thereby requiring the government to recognize existing rights (Azwar et al., 2021). However, implementation remains problematic.

Both locations are in legal ambiguity: *Dusun Buhuk* falls within "Production Forest" under provincial spatial planning despite generations of customary governance. Recognition applications submitted in 2019 remain pending after four years due to overlapping classifications. Provincial officials say there is a conflict between the Ministry of Environment and Forestry, which manages forest classifications, and the district government, which acknowledges traditional communities, leading to a standstill in the process. This situation leaves the community vulnerable because the production forest designation allows concession permits to be issued legally, even though customary governance lacks formal legal protection.

Bukit Tabun achieved partial success through Regent Decree Number 188.45/372/BPMPD/2016, recognizing the *Mapur* tribe as *masyarakat hukum adat*. However, this ruling does not extend to forest classification; sacred forest remains an "Other Land Use Area" (APL), vulnerable to conversion. Three mining permits (2010–2015) remain legally valid despite being suspended due to community resistance, with "acquired rights" protecting permit holders.

Pre-existing concession conflicts Acute regulatory conflicts emerge from overlapping concessions.

South Sumatra timber concession PT. Timber Jaya Sejahtera obtained a 2014 permit covering 2,400 ha, including 1,200 ha overlapping *Dusun Buhuk*. Community-organized blockades are preventing access. The multi-pronged resistance strategy included administrative challenges citing procedural violations, legal advocacy preparing litigation, direct resistance maintaining physical blockades, and media campaigns. After 18 months, the governor issued a temporary suspension (2016) pending a resolution of Indigenous rights.

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Negotiations failed, the community categorically refused logging regardless of compensation, while the company insisted on permit validity. As of 2024, the permit remains suspended in limbo, creating ongoing insecurity.

Bangka Belitung mining permits The district government issued three mining permits (20102015) overlapping Bukit Tabun. PT. Mineral Belitung's 2013 clearing attempt triggered community blockades involving 200 people, with physical confrontations injuring seven community members and three security personnel. LAM pursued strategic litigation and advocacy, achieving partial success: one permit was revoked (2016), one expired without renewal (2017), and one remains technically valid but unimplemented. However, legal vulnerability persists; the district retains authority to issue new permits without a formal protective designation.

Formal recognition procedures and bureaucratic barriers The recognition process under the MoEF Regulation P.21/2019 creates significant barriers. Key challenges: 1) Evidentiary burden, documentary evidence requirements disadvantage oral tradition cultures. *Dusun Buhuk*'s application was initially rejected because the community couldn't produce written pre-1945 documents; oral genealogies were dismissed as "insufficient evidence"; 2) Technical capacity gaps, formal mapping requires GPS, GIS, and expertise that communities lack. Bangka Belitung's participatory mapping took 14 months, cost 85 million IDR, and was funded through NGO grants, creating dependency on outsiders; and 3) Time delays and recognition procedures demonstrate bureaucratic inefficiency with years-long delays. *Dusun Buhuk* has been pending for four years; *Bukit Tabun* also has been pending for seven years without resolution.

Policy recommendations toward legal pluralism 1) **Presumptive recognition,** reverse burden of proof, granting provisional recognition status immediately upon preliminary evidence, preventing permit issuance pending verification; 2) **Co-management agreements**, develop formal frameworks between spiritual governance institutions and forestry offices granting legal protection while satisfying state oversight; 3) **Concession reform and mandatory FPIC,** implement genuine Free, Prior, Informed Consent with community veto authority, establishing a moratorium on new concessions in areas with pending recognition; 4) **Sacred site protection**, streamlining essential ecosystem area designation under Environmental Law Number 32/2009, providing immediate legal protection; and 5) **Hybrid governance institutions,** create district-level coordination bodies combining customary representatives, forestry officials, and civil society for joint management.

Regulatory engagement case study *Dusun Buhuk* demonstrates an effective multipronged strategy: constitutional challenges against spatial planning, continued recognition pursuit, ecotourism partnerships creating economic incentives, alliance building through regional indigenous networks, and media/documentation campaigns. This approach demonstrates indigenous communities' sophisticated capacity for navigating legal pluralism through multiple tactics.

The Indonesian regulatory context, while challenging, is not immutable. Constitutional reforms, growing indigenous rights consciousness, and international pressures create opportunities for integrating spiritual governance. However, integration must respect indigenous self-determination rather than subordinating spiritual authority to state bureaucracy and supporting and protecting indigenous institutions rather than controlling them.

Theoretical implications A comparative study reveals that both areas share three spiritual mechanisms: spiritual ontology, reciprocal relationships, and spiritual sanctions. Configurations differ, but conservation results are strikingly similar. The main differences lie in authority structures (centralized genealogical versus distributed meritocratic) and in ontology (individual ancestral versus collective spiritual). Fundamental similarities include a shared understanding of forest sacredness, effective spiritual sanctions, and substantial social compliance. This demonstrates that eco-spirituality is not a primitive, obsolete belief but a sophisticated governance technology achieving conservation outcomes superior to modern scientific management (Taylor, 2013).

These findings have important implications for conservation theory and practice. Spiritually based governance frameworks offer alternative models more suitable for indigenous contexts and more effective in achieving long-term conservation goals. Integration of spiritual perspectives in conservation strategies enhances both ecological and social sustainability (Iswandono et al., 2015). Research contributes to broader environmental anthropology debates regarding nature-culture dualism and ontological pluralism, supporting arguments for decolonizing conservation approaches and for recognizing indigenous knowledge systems as legitimate and valuable forms of environmental governance.

Research limitations This study acknowledges several limitations inherent to its design. The eight-month fieldwork period constrains the capture of long-term governance dynamics, while the two-site comparative design, although theoretically productive, limits broader geographic generalisability. Furthermore, the purposive sampling approach, centered on community members actively engaged in spiritual governance, may underrepresent dissenting individuals and those who have exited these systems, potentially introducing selection bias into the findings. At the methodological level, power asymmetries between researchers and informants may have restricted candid expressions of criticism toward spiritual authority structures. Additionally, the study does not systematically track individual-level rights outcomes or longitudinal trajectories of belief transformation. To address these gaps, future research should employ mixed longitudinal designs, expand regional comparisons, and integrate quantitative metrics that balance conservation effectiveness with rigorous rights-impact assessments.

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Conclusion

This research contends that the spiritual dimensions of localized epistemologies function as a sophisticated and efficacious technology of environmental governance. These dimensions are operationalized through a tripartite mechanism comprising spiritual ontology, authority, and sanctions, which collectively engender self-enforcing conservation systems that frequently outperform conventional state-centric or market-oriented models. Empirical evidence from *Dusun Buhuk* and *Bukit Tabun* underscores this efficacy: a remarkable forest cover retention of 98–100% over a 23-year trajectory stands in stark contrast to the 0.5–2% annual attrition rates characteristic of Indonesia's formally protected areas. Such data affirms that spiritually grounded governance yields superior ecological outcomes without the necessity for external enforcement infrastructure. By integrating deep ecology with eco-spirituality, this study provides a theoretical architecture to explain this resilience. Spiritual ontology conceptually reconstitutes forests as sentient, rights-bearing entities rather than mere extractable commodities. Concurrently, spiritual authority derives its legitimacy from genealogical and meritocratic recognition rather than bureaucratic appointment, while spiritual sanctions foster internalized compliance rooted in supernatural accountability—effectively rendering costly surveillance and legal coercion redundant. Although these systems manifest through diverse configurations, ranging from centralized genealogical authority in South Sumatra to distributed meritocratic governance in Bangka Belitung, they produce structurally equivalent conservation outcomes. This suggests that eco-spirituality is not merely localized folklore but a generalizable governance logic capable of maintaining adaptive capacity amidst modernization and regulatory contestation. Consequently, policy integration must move beyond the "accommodation of tradition" toward a genuine legal pluralism. This necessitates formalizing indigenous spiritual institutions, safeguarding self-determination through co-management, and ensuring internal protections for gender equity and youth participation, positioning these systems as evidence-based reforms essential for a sustainable and decolonized approach to global forest management.

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