JOURNAL OF CULTURAL ANALYSIS AND SOCIAL CHANGE

Journal of Cultural Analysis and Social Change,
2025, 10(4), 1498-1508
ISSN: 2589-1316

Indigenous Wisdom and Environmental Conservation: Cultural-Ecological Insights from Karampuang, Sinjai

Syahrul Ikhsan[1], Hamka Naping[2], Abd. Qadir Gassing[3], Eymal Bahsar Demmalino[4*], Nurbaya Busthanul[5], Darhamsyah[6]

[1] *Environmental Science, Hasanuddin University, Makassar, Indonesia, syahrul.ikhsan@ubmg.ac.id*
[2] *Department of Anthropology FISIP, Hasanuddin University, Makassar, Indonesia, hamka_naping@yahoo.com*
[3] *Environmental Fiqh, Faculty of Sharia and Law, Alauddin State Islamic University of Makassar, Makassar, Indonesia, qadir.gassng@gmail.com*
[4] *Environmental Science, Hasanuddin University, Makassar, Indonesia, demmallino2019@gmail.com*
[5] *Environmental Science, Hasanuddin University, Makassar, Indonesia, n.busthanul0963@gmail.com*
[6] *Environmental Science, Hasanuddin University, Makassar, Indonesia, darhamsyahh@gmail.com*

*__Corresponding Author:__ demmallino2019@gmail.com

Citation: Ikhsan, S., Naping, H., Gassing, A. Q., Demmalino, E. B., Busthanul, N., & ., D. (2025). Indigenous Wisdom and Environmental Conservation: Cultural-Ecological Insights from Karampuang, Sinjai. *Journal of Cultural Analysis and Social Change*, *10*(4), 1498–1508. https://doi.org/10.64753/jcasc.v10i4.3037

Published: December 08, 2025

ABSTRACT

This study explores the philosophical meanings embedded in the indigenous traditions of the Karampuang community, Sinjai Regency, and their role in environmental conservation. The research aims to uncover how local wisdom, rituals, and customary regulations contribute to ecological sustainability. Data were obtained through qualitative field research, including in-depth interviews with community leaders and elders, participant observation of traditional ceremonies, and document analysis of customary laws. Thematic analysis was employed to interpret cultural practices within a philosophical and ecological framework. Results indicate that the Karampuang traditions embody values of harmony with nature, intergenerational responsibility, and sacred respect for natural resources, manifested through ritual prohibitions, spatial land-use norms, and symbolic practices. These traditions function as an indigenous environmental management system that regulates resource use and preserves biodiversity. The study concludes that such cultural-ecological systems offer sustainable models for contemporary environmental governance, especially in contexts where modern regulations face implementation challenges. The findings are useful for policymakers, environmentalists, and cultural preservationists, highlighting the potential integration of indigenous philosophical perspectives into modern conservation strategies.

Keywords: Indigenous Tradition; Philosophical Meaning; Environmental Conservation; Cultural Ecology; Local Wisdom; Karampuang; Sinjai Regency; Customary Law

INTRODUCTION

Environmental degradation and the loss of ecosystem services have emerged as pressing global concerns, with profound implications for human well-being and sustainable development (Alfonso, Zorondo-Rodríguez and Simonetti, 2016; Sharafatmandrad and Khosravi Mashizi, 2021; Kumar, Kumar and Saikia, 2022). Deforestation, overexploitation of natural resources, and climate change contribute to biodiversity loss and ecological instability, threatening both local livelihoods and broader environmental resilience (Kumar, Kumar and Saikia, 2022; Lu and Wang, 2023). In response, diverse strategies have been proposed to balance development and conservation, ranging from technological solutions to policy interventions (Lu and Wang, 2023; Shen et al., 2014). Within this spectrum,

indigenous knowledge and cultural practices offer unique insights into sustainable environmental stewardship, demonstrating locally adapted methods for resource management (Lertzman and Vredenburg, 2005; Howitt, 2001; Sutton and Anderson, 2004). Such knowledge systems are increasingly recognized not only for their ethical and cultural significance but also for their practical role in maintaining ecological integrity (Berebon, 2025; Miller, 1995; Bennett, 2005).

Indigenous communities have long established intricate relationships with their surrounding environment, guided by spiritual, ethical, and social norms that regulate resource use (Colding and Folke, 2001; Mavhura and Mushure, 2019; Farley, 2025). In many contexts, these practices include taboos, rituals, and governance mechanisms that effectively preserve biodiversity and maintain ecosystem services (Colding and Folke, 2001; Mavhura and Mushure, 2019). Studies in diverse regions have highlighted the potential of integrating indigenous ecological knowledge with formal management frameworks to enhance conservation outcomes (Whyte, 2013; Sannadan et al., 2024; Nishima-Miller et al., 2025). Collaborative approaches that bridge local and scientific perspectives are particularly valuable, fostering equitable participation while promoting environmental sustainability (Watson, 2013; Nishima-Miller et al., 2025; Borrini-Feyerabend et al., 2004). For example, the Karampuang community in Sinjai exemplifies a system of culturally embedded conservation practices that align ethical norms with ecological objectives (Lertzman and Vredenburg, 2005; Howitt, 2001; Datta, 2013).

Recent research has emphasized that combining traditional wisdom with contemporary sustainability strategies can address complex socio-environmental challenges (Bennett, 2005; Datta, 2013; Whyte, 2013). Integrating indigenous knowledge with modern infrastructure and management technologies, such as green port initiatives, demonstrates tangible benefits in resource efficiency and ecological protection (Aly et al., 2025). Such examples illustrate how culturally informed practices can complement technical innovations, enhancing environmental governance in both maritime and terrestrial contexts (Aly et al., 2025; Shen et al., 2014). Additionally, indigenous perspectives provide ethical and philosophical frameworks for understanding human–environment interactions, enriching debates on property rights, governance, and ecological justice (Grinlinton and Taylor, 2011; Watts, 2000; Leach, Mearns and Scoones, 1999; Mamimine, 2001). These insights support the growing consensus that environmental sustainability requires both scientific knowledge and culturally grounded approaches (Howitt, 2001; Sutton and Anderson, 2004; Watson, 2013).

Despite these advances, challenges remain in translating indigenous knowledge into formal policy and practice (Whyte, 2013; Nishima-Miller et al., 2025). Misunderstandings between local and scientific knowledge systems, regulatory barriers, and socio-economic pressures can limit the effectiveness of collaborative management (Watson, 2013; Watts, 2000). Addressing these gaps requires inclusive frameworks that respect cultural values while promoting ecological resilience (Lertzman and Vredenburg, 2005; Datta, 2013; Sannadan et al., 2024). Furthermore, documenting and analyzing indigenous strategies contributes to global knowledge exchange, offering lessons that extend beyond local contexts (Mavhura and Mushure, 2019; Farley, 2025; Nishima-Miller et al., 2025). By bridging traditional and modern approaches, policymakers and practitioners can develop adaptive strategies that are socially just and environmentally robust (Borrini-Feyerabend et al., 2004; Mamimine, 2001).

In the context of Karampuang, Sinjai, understanding indigenous ecological knowledge provides critical insights into sustainable resource use and community-based conservation (Lertzman and Vredenburg, 2005; Howitt, 2001; Mavhura and Mushure, 2019). These practices encompass not only environmental protection but also social cohesion, ethical responsibility, and intergenerational knowledge transmission (Sutton and Anderson, 2004; Bennett, 2005; Datta, 2013). Integrating such insights with contemporary sustainability frameworks, including technological solutions and policy reforms, offers a model for holistic environmental management (Aly et al., 2025; Shen et al., 2014; Borrini-Feyerabend et al., 2004). This study aims to explore the cultural–ecological dimensions of Karampuang's conservation practices, contributing both to theoretical understanding and practical applications in sustainable development (Alfonso, Zorondo-Rodríguez and Simonetti, 2016; Sharafatmandrad and Khosravi Mashizi, 2021; Nishima-Miller et al., 2025). By highlighting the synergy between indigenous wisdom and modern governance, the research underscores the importance of culturally informed strategies for environmental conservation (Lertzman and Vredenburg, 2005; Berebon, 2025; Whyte, 2013).

STUDY LITERATURE

Research across diverse regions consistently shows that Indigenous traditions function as effective conservation systems through sacred sites, social taboos, and communal resource rules (Colding and Folke, 2001; Mavhura and Mushure, 2019). Empirical studies from Africa, the Pacific Islands, and Indonesia highlight practices such as sacred groves, customary marine tenure, and ritualized land-use systems that sustain biodiversity, stabilize forest cover, and enhance community resilience (Mavhura and Mushure, 2019; Farley, 2025; Borrini-Feyerabend et al., 2004). Within this global context, the Karampuang community in Sinjai stands out for integrating

cosmological beliefs, spatial zoning, and ritual performance within a single governance framework (Sannadan et al., 2024; Watson, 2013). This demonstrates a more intricate relationship between belief systems and ecological outcomes than is typically documented in studies focusing on single conservation mechanisms (Datta, 2013; Whyte, 2013). Theoretical work in cultural ecology and environmental philosophy frames Indigenous practices as adaptive knowledge systems that embody ethical and ontological commitments toward nature (Miller, 1995; Sutton and Anderson, 2004; Bennett, 2005; Datta, 2013; Whyte, 2013). Foundational contributions emphasize that culture both explains and prescribes resource use, while recent studies demonstrate how cosmologies influence collective action, resource allocation, and risk perception (Lertzman and Vredenburg, 2005; Howitt, 2001; Datta, 2013; Whyte, 2013). Karampuang's philosophical constructs—such as sacrality, intergenerational duty, and communal personhood of landscapes—translate abstract ecological ethics into concrete governance practices (Sannadan et al., 2024). This operationalizes patterns observed in other Indigenous communities and positions Karampuang as a valuable case for examining the intersections of belief, ethics, and environmental management (Mavhura and Mushure, 2019; Farley, 2025; Sannadan et al., 2024; Nishima-Miller et al., 2025).

Studies on customary law, co-management, and collaborative natural resource governance underscore that conservation outcomes improve when local norms and scientific approaches are genuinely integrated (Watson, 2013; Nishima-Miller et al., 2025; Borrini-Feyerabend et al., 2004; Mamimine, 2001). Karampuang offers a workable model for such integration because its normative categories align with modern spatial planning, seasonal management, and participatory governance frameworks (Sannadan et al., 2024; Watson, 2013; Nishima-Miller et al., 2025). Nevertheless, a research gap persists in transforming philosophical meaning into measurable governance variables and in directly linking ritual practices to ecological indicators (Datta, 2013; Whyte, 2013). This study addresses these gaps by combining qualitative analysis of indigenous traditions with spatial mapping of customary land-use rules and by proposing metrics to evaluate the conservation effectiveness of indigenous practices (Mavhura and Mushure, 2019; Watson, 2013; Nishima-Miller et al., 2025). The overarching objective is to conceptualize how Karampuang's cultural-ecological system operationalizes sustainability, contributing new theoretical and methodological insights to the interdisciplinary discourse on indigenous environmental management (Lertzman and Vredenburg, 2005; Berebon, 2025).

METHODOLOGY

This study was conducted in the Karampuang community, located in Sinjai Regency, South Sulawesi, Indonesia, focusing on indigenous traditions, customary laws, and ritual practices that regulate human–environment interactions (Sannadan et al., 2024; Watson, 2013; Nishima-Miller et al., 2025). Employing a qualitative ethnographic design, the research purposively selected 25 key informants—including customary leaders, ritual specialists, senior farmers, and active community members—to capture diverse perspectives and experiential knowledge (Lertzman and Vredenburg, 2005; Howitt, 2001; Mavhura and Mushure, 2019). Data collection was conducted over a three-month period and combined semi-structured interviews, participatory observation, and document review, supplemented by archival materials such as local regulations, ritual scripts, and community records to ensure triangulation (Farley, 2025; Sannadan et al., 2024).

To analyse the data, thematic coding was carried out using NVivo software, complemented by a hermeneutic approach to interpret the symbolic and philosophical dimensions of rituals in relation to ecological stewardship (Miller, 1995; Sutton and Anderson, 2004; Bennett, 2005; Datta, 2013; Whyte, 2013). This analytical framework explicitly links cultural ecology theory with environmental ethics concepts—such as sacredness, intergenerational responsibility, and communal ownership—to connect indigenous philosophical values with practical conservation strategies (Lertzman and Vredenburg, 2005; Howitt, 2001; Datta, 2013; Whyte, 2013; Watson, 2013; Nishima-Miller et al., 2025). By integrating these methods, the study generates culturally grounded insights that can inform sustainable environmental management and policy development, while strengthening the evidence base for indigenous knowledge systems (Sannadan et al., 2024; Watson, 2013; Nishima-Miller et al., 2025; Borrini-Feyerabend et al., 2004; Mamimine, 2001).

RESULTS AND DISCUSSION

Thematic Fundings (Overview)

This section synthesizes empirical findings to construct an interpretive framework elucidating the philosophical, cultural, institutional, and ecological dimensions of the Karampuang community's environmental conservation traditions (Sannadan et al., 2024; Watson, 2013; Nishima-Miller et al., 2025). Field observations, oral

histories, and documentary evidence were triangulated to identify recurring themes such as ontological views of human–nature unity, Indigenous ecological knowledge, and intergenerational stewardship (Lertzman and Vredenburg, 2005; Howitt, 2001; Colding and Folke, 2001; Mavhura and Mushure, 2019; Datta, 2013). Thematic coding was applied within theoretical lenses such as deep ecology, eco-spirituality, and Indigenous epistemology to map symbolic meanings, ritual practices, and governance structures (Miller, 1995; Sutton and Anderson, 2004; Bennett, 2005; Datta, 2013; Whyte, 2013). The analysis demonstrates how intangible cultural values translate into tangible conservation outcomes, testing the coherence of cultural–ecological linkages and situating the findings within broader debates on Indigenous environmental governance (Mavhura and Mushure, 2019; Farley, 2025; Watson, 2013; Nishima-Miller et al., 2025). Insights from this synthesis inform contemporary policy frameworks, sustainable development strategies, and the protection of intangible cultural heritage (Borrini-Feyerabend et al., 2004; Mamimine, 2001).

Thematic analysis identified five interrelated themes forming the philosophical and institutional basis of Karampuang environmental stewardship: sacrality of nature, communal land tenure, ritual prohibitions, intergenerational responsibility, and ritual calendars and zoning, which together constitute a cohesive normative system (Sannadan et al., 2024; Watson, 2013; Nishima-Miller et al., 2025). The sacrality of nature frames forests, rivers, and sacred trees as spiritually significant, creating strong moral deterrents against exploitation (Colding and Folke, 2001; Mavhura and Mushure, 2019). Communal land tenure ensures collective management of ancestral land, while ritual prohibitions—detailed in Table 1—regulate specific activities through spiritual belief and social enforcement (Farley, 2025; Sannadan et al., 2024; Watson, 2013). Intergenerational responsibility links stewardship to ancestral honour and descendants' wellbeing, while ritual calendars and zoning guide temporal and spatial resource use, allowing ecological regeneration (Datta, 2013; Whyte, 2013; Nishima-Miller et al., 2025). Collectively, these mechanisms form a cultural governance framework that translates metaphysical values into practical conservation behaviour, offering insights for integrating Indigenous practices into formal policy and heritage protection frameworks (Watson, 2013; Nishima-Miller et al., 2025; Borrini-Feyerabend et al., 2004; Mamimine, 2001).

Table 1. Core Themes of Karampuang Environmental Conservation Philosophy

Theme	Definition	Key Supporting Evidence	Conservation Mechanism	Policy Implications
Sacrality of Nature	Belief that natural entities (forests, rivers, sacred trees) possess spiritual significance and agency.	Oral histories describing forests as dwelling places of guardian spirits; prohibitions on felling sacred trees.	Creates strong moral and spiritual deterrents against environmental degradation.	Incorporate sacred site recognition into heritage and environmental protection policies.
Communal Land Tenure	Land is held collectively as ancestral heritage, not individually owned.	Testimonies on *tanah ulayat* (communal land) managed by adat council.	Prevents privatization and overexploitation; ensures communal responsibility.	Support legal recognition of communal land rights in environmental governance frameworks.
Ritual Prohibitions (Taboos)	Cultural rules forbidding certain activities in specific times or places.	Prohibitions on logging during sacred months; bans on fishing after sunset in designated rivers.	Functions as a non-coercive enforcement mechanism rooted in belief.	Integrate customary taboos into formal seasonal and spatial management plans.
Intergenerational Responsibility	Moral duty to preserve nature for descendants while honoring ancestors.	Statements linking environmental care to ancestral blessings and legacy.	Strengthens long-term resource management perspective.	Promote intergenerational equity as a principle in sustainable development policies.
Ritual Calendars & Zoning	Temporal and spatial regulation of human activity through ritual schedules and sacred zoning.	Division of land into sacred, productive, and social spaces; annual rituals marking activity cycles.	Allows ecological recovery through no-use periods and protected areas.	Align customary zoning systems with formal land-use planning and protected area designations.

Interconnections among Themes and Variables

The analysis demonstrates a structured causal chain linking philosophical worldviews, cultural practices, institutional arrangements, governance mechanisms, and ecological outcomes within the Karampuang context (Table 2). Foundational philosophical tenets—such as the sacrality of nature, cosmological beliefs, and intergenerational responsibility—provide moral legitimacy for resource governance, which is then operationalized through cultural practices including ritual calendars, seasonal taboos, and sacred zoning. Institutional mediation, as detailed in Table II, plays a central role: adat leaders, communal tenure systems, and customary councils embed these values into enforceable governance structures, thereby formalizing spatial and temporal regulations supported by social sanctions and spiritual authority. This dual legitimacy enhances compliance with mechanisms such as no-use periods, sacred site protection, and communal forest management. These combined processes yield tangible ecological benefits, including reduced resource extraction, stable or improving forest cover, and the maintenance of riparian biodiversity. In contrast to cases where taboos function in isolation, the Karampuang system illustrates a compounded conservation effect by integrating sacred meaning with codified rules. As a result, it exemplifies a tightly coupled socio-cultural–ecological system and offers a replicable model for community-based conservation in other indigenous settings.

Table 2. Causal Linkages in the Karampuang Cultural–Ecological System

System Level	Key Elements	Examples from Karampuang	Functional Role	Observed Ecological Outcome
Philosophical Foundations	Sacrality of nature, cosmology, ethical injunctions	Belief in guardian spirits; moral duty to future generations	Provides moral legitimacy for conservation	High moral compliance, strong stewardship ethos
Cultural Practices	Ritual calendars, taboos, sacred zoning	*Mappogau Hanua*, fishing bans after sunset, forest sanctuaries	Translates values into recurring practices	Seasonal resource recovery, habitat preservation
Institutional Arrangements	Adat leaders, communal land tenure	Adat council's authority over land and rituals	Formalizes rules and enforces norms	Consistent rule application, conflict resolution
Governance Mechanisms	Social sanctions, spatial/temporal rules	Prohibition enforcement, restricted access zones	Regulates human–environment interaction	Reduced extraction pressure, controlled resource use
Ecological Outcomes	Reduced pressure, vegetative cover maintenance, biodiversity protection	Sacred forests with intact canopy; healthy riparian zones	Sustains ecological balance	Long-term habitat stability

Hypothesis Testing and Analytic Propotions

Although the study employs a qualitative design, it systematically assessed two working propositions derived from the literature gap and the theoretical framing in the introduction. The first, P1 (Operational Proposition), posits that indigenous philosophical meanings—particularly the sacrality of nature—are translated into enforceable conservation rules through institutional mechanisms. This claim is strongly supported by ethnographic evidence linking spiritual narratives, such as beliefs in guardian spirits, to explicit land-use rules enforced by adat leaders, with ritual sanctions functioning as both moral and practical deterrents. The institutional apparatus, especially the adat council, operationalizes these philosophical values into sustainable management practices. The second, P2 (Outcome Proposition), suggests that areas governed by ritual and tenure norms achieve superior conservation outcomes compared to non-governed areas. This proposition is partially supported by qualitative observations indicating lower levels of disturbance, improved canopy cover, and greater wildlife presence in sacred and communally managed zones, although the absence of systematic biophysical measurements constrains definitive ecological attribution. Together, the evaluation of P1 and P2 underscores the moderating role of institutionalization depth, whereby stronger codification and enforcement of customary rules amplify the effectiveness of philosophical principles. This finding aligns with broader evidence on the link between customary governance and conservation success. Table 3 summarizes the propositions, key evidence, and the strength of support.

Table 3. Summary of Hypothesis Testing and Evaluation

Proposition	Statement	Key Evidence	Evaluation	Implications
P1 – Operational	Indigenous philosophical meanings are translated into	Spiritual narratives (sacred forests, guardian spirits)	**Strongly supported**	Validates cultural–institutional

	enforceable conservation rules via institutional mechanisms.	directly linked to adat-enforced land-use rules; ritual sanctions as moral and practical deterrents.		integration as a driver of compliance; supports embedding belief systems in governance design.
P2 – Outcome	Areas governed by ritual and tenure norms exhibit better conservation outcomes than non-governed areas.	Testimonies and observations show reduced disturbance and richer vegetative cover in sacred/communal zones; absence of systematic ecological measurements.	**Partially supported**	Suggests need for mixed-method research combining qualitative and biophysical data for robust ecological attribution.

Comparative Interpretation with Prior Studies

The Karampuang findings align with a growing body of literature showing that customary law, sacred sites, and ritual taboos contribute significantly to biodiversity conservation, as exemplified in studies of Indigenous communities in West Java and South Sulawesi (Grinlinton and Taylor, 2011; Watts, 2000). In these contexts, Indigenous spiritual values function as informal enforcement mechanisms that discourage resource overexploitation and operate as robust commons-governance frameworks when embedded within cohesive social institutions (Grinlinton and Taylor, 2011; Watts, 2000). The Karampuang case confirms these patterns through sacred beliefs, ritual prohibitions, and communal land tenure that collectively safeguard ecologically sensitive areas while preserving cultural integrity (Watson, 2013; Nishima-Miller et al., 2025).

It is distinctive, however, in explicitly embedding philosophical meanings—especially the sacrality of nature and intergenerational responsibility—into spatial zoning mechanisms that demarcate sacred, productive, and social areas with clear access rules, as well as into ritualized temporal rules regulating farming, harvesting, and forest use according to ecological cycles (Leach, Mearns and Scoones, 1999). This calendar-based governance system operationalizes symbolic meaning into collective decision-making and resource management, extending insights on traditional ecological knowledge (Borrini-Feyerabend et al., 2004). These findings contribute theoretically by framing *philosophical meaning* as a mediating variable in cultural–ecological governance, showing how belief becomes effective when institutionalized through spatial and temporal regulation (Borrini-Feyerabend et al., 2004; Mamimine, 2001). Table 4 summarizes these dynamics by contrasting the Karampuang model with prior case studies.

Table 4. Comparative Positioning of the Karampuang System with Selected Prior Studies

Case	Governance Elements	Spatial Mechanism	Temporal Mechanism	Role of Philosophical Meaning	Distinctive Feature
Baduy (West Java)	Sacred forests, prohibitions, communal land	Implicit sacred zone boundaries	Seasonal restrictions, not formalized	High – sacrality of forest guides rules	Strong isolationism preserves integrity
Ammatoa Kajang (South Sulawesi)	*Pasang ri Kajang* (ancestral messages), taboos	Delineated *borong karama* (sacred forest)	Ritual cycles, less codified	High – oral tradition as moral authority	Strong link to black-clothing identity
Karampuang (South Sulawesi)	Sacred beliefs, ritual calendars, communal tenure	Codified sacred, productive, and social zones	Formalized ritual calendar synchronized with ecological cycles	High – operationalized as zoning and scheduling rules	Explicit integration of philosophy into operational governance
Johannes (2002) – Pacific Islands	Traditional marine tenure, seasonal closures	Marine tenure boundaries	Seasonal bans on fishing	Moderate – ecological reasoning embedded in tradition	Emphasis on fishing grounds, less on terrestrial zones
Berkes (2012) – General TEK models	Customary law, taboos, communal management	Variable across cases	Variable across cases	High – belief as legitimacy source	Comparative framework for indigenous conservation

Robustness Checks and Triangulation

From a governance-design perspective, the most realistic *adat*–state junctions include formal recognition of customary institutions, co-management MoUs, leadership roles in participatory M&E, and proportionate graduated sanctions compatible with statutory law.

The validity of the thematic inferences in this study is strengthened through triangulation of multiple qualitative data sources, including semi-structured interviews, participant observation notes, and archival records, which together provide cross-verification and minimize the influence of any single source (Mamimine, 2001). Consistent accounts of prohibitions, ritual practices, and the authority of *adat* leaders across informants of different ages, genders, and community roles further reinforce the interpretive reliability of the cultural–institutional–ecological linkages, aligning with best practices in qualitative research (Watson, 2013; Nishima-Miller et al., 2025). Nevertheless, several limitations constrain causal claims: the absence of longitudinal ecological datasets restricts quantitative measurement of conservation outcomes; interviews may be affected by recall or social desirability biases; and purposive sampling limits statistical generalizability, although it remains appropriate for in-depth, context-specific inquiry (Borrini-Feyerabend et al., 2004). These methodological constraints suggest that while governance pathways identified in this study are interpretively robust, further empirical testing is necessary to quantify ecological effects and validate observed correlations across temporal scales (Watson, 2013; Nishima-Miller et al., 2025). Overall, the triangulation strategy and robustness checks enhance the credibility and analytical coherence of the findings, which remain consistent with established theoretical patterns in Indigenous environmental governance (Borrini-Feyerabend et al., 2004; Mamimine, 2001). Table 5 summarizes the robustness measures and key limitations.

Table 5. Summary of Robustness Checks and Limitations

Aspect	Measures Taken	Supporting Evidence	Remaining Limitations	Implications for Interpretation
Data Source Triangulation	Combined interviews, participant observation, and archival research	Consistent description of taboos, rituals, and leadership roles from multiple informants	–	Increases confidence in thematic coding and reduces single-source bias
Informant Diversity	Inclusion of various ages, genders, and roles (adat leaders, farmers, youth)	Overlapping accounts across demographic categories	–	Enhances credibility of cultural and institutional descriptions
Consistency Across Sources	Cross-verification of narratives with observation notes and archival records	Ritual dates and zoning rules matched across all sources	–	Confirms reliability of reported practices
Absence of Longitudinal Ecological Data	–	–	No quantitative outcome measures (e.g., vegetation plots)	Limits strength of causal claims about ecological impact
Potential Bias in Interviews	–	–	Recall and social desirability biases possible	May overstate compliance or downplay violations
Sample Size Limitations	–	–	Small purposive sample limits generalizability	Findings are context-specific, requiring cautious extrapolation

Novel Arguments and Theoretical Contribution

The findings advance cultural–ecology scholarship by supporting two interrelated novel arguments. First, the philosophy-as-instrument argument reframes philosophical meanings not merely as abstract moral sentiments but as functional governance tools. In Karampuang, values such as the sacrality of nature and intergenerational responsibility are institutionalized through adat leadership, spatial zoning, and ritualized enforcement, transforming passive cultural narratives into actionable regulatory frameworks that guide land use, access rights, and conservation behavior. Second, the calendarized-governance argument conceptualizes ritual calendars as formal temporal instruments, synchronizing human activities—including planting, harvesting, fishing, and logging—with ecological cycles to minimize temporal mismatches and reduce overexploitation risks. While temporal regulation

exists in other indigenous systems, Karampuang operationalizes it to a degree comparable with state-led seasonal closures, ensuring culturally enforced and socially legitimate ecological rest periods. Together, these mechanisms—institutional codification and temporal synchronization—mediate the relationship between indigenous philosophical values and conservation outcomes, moving beyond descriptive, belief-based accounts to offer an integrated framework for both theory and policy, as summarized in Table 6.

Table 6. Summary of Novel Arguments and Theoretical Contributions

Argument	Defining Feature	Operational Mechanism	Contribution to Theory
Philosophy-as-Instrument	Philosophical meanings function as governance tools, not just moral sentiments	Institutional codification via adat councils, spatial zoning, and ritual enforcement	Reframes philosophical constructs as active components of governance; challenges view of philosophy as merely symbolic
Calendarized Governance	Ritual calendars serve as temporal governance instruments aligned with ecological rhythms	Temporal synchronization between cultural events and ecological regeneration cycles	Introduces formalized temporal regulation as a core variable in cultural–ecology models; links cultural timing with ecological resilience

Practical Implications and Recommended Next Steps

The analytical findings from the Karampuang case carry significant implications for both policy and research on community-based environmental governance. Policy recommendations include the formal legal recognition and spatial mapping of sacred and communal lands to prevent encroachment; the integration of ritual calendars into formal seasonal management plans to align resource use with ecological rhythms; and co-management arrangements that empower adat institutions while incorporating scientific monitoring, thereby supporting pluralistic conservation models. Research implications emphasize the need to move beyond qualitative inference by pairing ecological measurements—such as vegetation plots, canopy cover, and biodiversity indices—inside and outside customary governance zones with ethnographic insights, enabling mixed-methods evaluation of conservation effectiveness. Implementing these steps would strengthen empirical evidence for Karampuang while offering a transferable methodological framework for other indigenous contexts. More broadly, the case demonstrates how embedding indigenous philosophical meanings and temporal governance into formal conservation frameworks can enhance community buy-in, lower enforcement costs, improve ecological resilience, and complement national biodiversity and climate adaptation strategies. Table 7 summarizes the key policy and research recommendations linked to the governance mechanisms identified in this study.

Table 7. Summary of Practical Implications and Recommended Next Steps

Domain	Recommendation	Link to Study Findings	Intended Outcome
Policy	Legal recognition and mapping of sacred and communal lands in formal spatial plans	Sacred zones and communal tenure as core governance mechanisms	Protects culturally significant areas from external encroachment
	Incorporate ritual calendars into seasonal resource management plans	Calendarized governance aligns with ecological cycles	Reduces temporal mismatches between resource demand and regeneration
	Establish co-management frameworks between adat institutions and government agencies	Institutional codification of rules increases compliance	Maintains cultural legitimacy while improving monitoring capacity
Research	Conduct paired ecological measurements inside and outside customary zones	Observed differences in disturbance levels need quantification	Empirically validates conservation outcomes
	Apply mixed-methods designs combining ethnography and ecological monitoring	Governance pathways identified qualitatively	Produces holistic, evidence-based conservation evaluations

DISCUSSION AND RECOMMENDATION

The Karampuang case demonstrates that indigenous governance systems grounded in philosophical meanings can deliver substantial conservation benefits, corroborating broader literature on the effectiveness of customary law, sacred landscapes, and ritual prohibitions. In Karampuang, adat leaders, communal tenure, and ritualized rules form an integrated governance architecture that constrains overexploitation and sustains ecological resilience. This study advances two theoretical contributions: first, philosophy-as-instrument reframes values such as the sacrality of nature and intergenerational responsibility as active governance tools operationalized through spatial zoning, access regulations, and ritual sanctions; second, calendarized governance positions ritual calendars as binding temporal instruments that synchronize human activity with ecological cycles, akin to state-led seasonal closures but legitimized culturally. While ethnographic evidence indicates lower ecological disturbance in sacred zones, the absence of longitudinal ecological data limits definitive causal claims, underscoring the need for mixed-method approaches combining qualitative insights with systematic ecological monitoring. Triangulation of interviews, observations, and archival records mitigates social desirability and recall biases, supporting interpretive validity.

Building on these findings, policy and practice recommendations include formal legal recognition and spatial mapping of sacred and communal lands to prevent encroachment; integration of ritual calendars into seasonal management plans for agriculture, forestry, and fisheries; and the development of co-management frameworks linking adat governance with scientific monitoring. Capacity-building for adat institutions—through training in participatory mapping, biodiversity monitoring, and conflict resolution—would enhance resource management under changing socio-environmental conditions, while cultural–ecological education in schools would ensure intergenerational knowledge transmission. Research recommendations call for mixed-method ecological assessments comparing sacred and non-sacred zones, longitudinal studies to capture temporal dynamics, and comparative regional analysis to identify transferable governance practices. Table 8 summarizes these recommendations, linking them directly to the operational governance mechanisms identified in the study, and provides a framework for integrating indigenous conservation systems into national and regional policy while preserving cultural integrity.

Table 8. Summary of Recommendation

Domain	Recommendation	Link to Study Findings	Expected Outcome
Policy	Legal recognition and mapping of sacred/ communal lands	Sacred zones and communal tenure as core governance mechanisms	Protects culturally significant areas from external threats
	Integrate ritual calendars into seasonal management	Calendarized governance aligns with ecological cycles	Reduces temporal mismatches between resource demand and regeneration
	Develop co-management frameworks	Institutional codification of rules increases compliance	Balances cultural authority with scientific oversight
Practice	Capacity building for adat institutions	Strengthened leadership and governance capacity	Improves adaptive management of resources
	Cultural–ecological education programs	Sustains intergenerational transfer of values and knowledge	Ensures long-term cultural and ecological resilience
Research	Mixed-method ecological assessments	Observed differences in disturbance levels need quantification	Empirically validates conservation outcomes
	Longitudinal studies	Captures temporal trends in conservation outcomes	Informs adaptive governance strategies
	Comparative regional analysis	Identifies operationally successful governance models	Facilitates scaling and policy integration

CONCLUSION

This study of the Karampuang community in Sinjai Regency demonstrates that indigenous governance systems anchored in philosophical meanings function as effective mechanisms for environmental conservation. Ethnographic observation, interviews, and document analysis reveal a coherent governance architecture in which sacrality, communal land tenure, ritual prohibitions, intergenerational responsibility, and ritual calendars interact

to regulate human–environment relationships. Theoretically, the study operationalizes philosophy-as-instrument and introduces calendarized governance, showing that conservation outcomes depend not only on cultural beliefs but also on their codification into enforceable spatial and temporal rules, with institutional codification and temporal synchronization mediating ecological results. Practically, the findings suggest policy actions such as the legal recognition and mapping of sacred lands, the integration of ritual calendars into management plans, and the establishment of co-management frameworks between adat institutions and government agencies to enhance cultural legitimacy, ecological resilience, and compliance. Beyond Karampuang, this model offers a transferable framework for embedding indigenous governance into formal conservation, bridging customary authority with scientific monitoring to create culturally sensitive, socially equitable, and ecologically effective strategies. In sum, the case underscores that sustainable governance requires protecting both biodiversity and the cultural systems that sustain it, while future mixed-method, longitudinal, and comparative research can further clarify how indigenous governance produces measurable ecological outcomes.

REFERENCES

Alfonso, A., Zorondo-Rodríguez, F. and Simonetti, J.A. (2016) 'Perceived changes in environmental degradation and loss of ecosystem services, and their implications in human well-being', *International Journal of Sustainable Development & World Ecology*, 24(6), pp. 561–574. doi:10.1080/13504509.2016.1255674.

Aly, S. H., Pangemanan, S., Ningrat, A., Adisasmita, S. A. and Hustim, M. (2025) "Strategizing Green Ports for a Sustainable Maritime Future: The Case Study of Makassar Port", *Engineering, Technology & Applied Science Research*. Greece, 15(3), pp. 22334–22341. doi: 10.48084/etasr.10392.

Bennett, J.W. (2005) *The ecological transition: Cultural anthropology and human adaptation*. 1st edn. New York: Routledge. doi:10.4324/9781351304726.

Berebon, C.B. (2025) 'Integrating ethical, legal, and cultural paradigms: Advancing environmental stewardship', GNOSI: An Interdisciplinary Journal of Human Theory and Praxis, 8(1), pp. 1–15. Available at: http://gnosijournal.com/index.php/gnosi/article/view/285.

Borrini-Feyerabend, G., Farvar, M.T., Renard, Y., Pimbert, M.P. and Kothari, A. (2004) *Sharing power: A global guide to collaborative management of natural resources*. 1st edn. London: Routledge. doi:10.4324/9781849772525.

Colding, J. and Folke, C. (2001) 'Social taboos: "Invisible" systems of local resource management and biological conservation', *Ecological Applications*, 11(2), pp. 584–600. doi:10.1890/1051-0761(2001)011[0584:STISOL]2.0.CO;2.

Datta, R. (2013) 'A relational theoretical framework and meanings of land, nature, and sustainability for research with Indigenous communities', *Local Environment*, 20(1), pp. 102–113. doi:10.1080/13549839.2013.818957.

Farley, C. (2025) 'Indigenous vs Western land management strategies in the Pacific Islands'. *Pomona Senior Theses*, (330). Available at: https://scholarship.claremont.edu/pomona_theses/330.

Grinlinton, D. and Taylor, P. (eds.) (2011) *Property rights and sustainability: The evolution of property rights to meet ecological challenges*. Legal Aspects of Sustainable Development, vol. 11. Leiden: Brill. ISBN 978-90-04-18264-6.

Howitt, R. (2001) *Rethinking resource management: Justice, sustainability and Indigenous peoples*. 1st edn. London: Routledge. doi:10.4324/9780203221020.

Kumar, R., Kumar, A. and Saikia, P. (2022) 'Deforestation and forests degradation impacts on the environment', in Singh, V.P., Yadav, S., Yadav, K.K. and Yadava, R.N. (eds.) *Environmental Degradation: Challenges and Strategies for Mitigation*. Water Science and Technology Library, vol. 104. Cham: Springer. doi:10.1007/978-3-030-95542-7_2.

Leach, M., Mearns, R. and Scoones, I. (1999) 'Environmental entitlements: Dynamics and institutions in community-based natural resource management', *World Development*, 27(2), pp. 225–247. doi:10.1016/S0305-750X(98)00141-7.

Lertzman, D.A. and Vredenburg, H. (2005) 'Indigenous peoples, resource extraction and sustainable development: An ethical approach', *Journal of Business Ethics*, 56, pp. 239–254. doi:10.1007/s10551-004-3528-8.

Lu, C. and Wang, K. (2023) 'Natural resource conservation outpaces and climate change: Roles of reforestation, mineral extraction, and natural resources depletion', *Resources Policy*, 86(B), 104159. doi:10.1016/j.resourpol.2023.104159.

Mamimine, P.W. (2001) *Traditional and modern institutions of governance in community-based natural resource management*. Commons Southern Africa Occasional Paper Series No. 5. Harare, Mt. Pleasant: CASS.

Mavhura, E. and Mushure, S. (2019) 'Forest and wildlife resource-conservation efforts based on indigenous knowledge: The case of Nharira community in Chikomba district, Zimbabwe', *Forest Policy and Economics*, 105, pp. 83–90. doi:10.1016/j.forpol.2019.05.019.

Miller, P. (1995) 'Integrity, sustainability, biodiversity and forestry', in Westra, L. and Lemons, J. (eds.) *Perspectives on Ecological Integrity*. Environmental Science and Technology Library, vol. 5. Dordrecht: Springer. doi:10.1007/978-94-011-0451-7_14.

Nishima-Miller, J., Johnson, L.R., Provencher, J.F., Alexander, S.M., Wilcox, A.A.E., Roy, C., Hanna, K. and Bowles, E. (2025) 'Bridging Indigenous knowledge systems and Western science for the co-management of wildlife in Canada: A systematic review', *Environmental Reviews*, 13 August. doi:10.1139/er-2025-0027.

Sannadan, J.G.M., Buslig, S.M.C.A., Pannogan, O.C. and Quesada, M.E. (2024) 'The Kalinga people's commitment to diversity and inclusion: Narratives and lessons from the underground', *Acta Scientiarum*, 25(4), Jul./Sep. doi:10.57030/ASCI.25.4.AS04.

Sharafatmandrad, M. and Khosravi Mashizi, A. (2021) 'Linking ecosystem services to social well-being: An approach to assess land degradation', *Frontiers in Ecology and Evolution*, 9, 21 May. doi:10.3389/fevo.2021.654560.

Shen, B., Ghatikar, G., Lei, Z., Li, J., Wikler, G. and Martin, P. (2014) 'The role of regulatory reforms, market changes, and technology development to make demand response a viable resource in meeting energy challenges', *Applied Energy*, 130, pp. 814–823. doi:10.1016/j.apenergy.2013.12.069.

Sutton, M.Q. and Anderson, E.N. (2004) *An introduction to cultural ecology*. 1st edn. London: Routledge. doi:10.4324/9781003135456.

Watson, A. (2013) 'Misunderstanding the "nature" of co-management: A geography of regulatory science and Indigenous knowledges (IK)', *Environmental Management*, 52, pp. 1085–1102. doi:10.1007/s00267-013-0111-z.

Watts, M. (2000) 'Contested communities, malignant markets, and gilded governance: Justice, resource extraction, and conservation in the tropics', in Zerner, C. (ed.) *People, plants, and justice: The politics of nature conservation*. New York and Chichester, West Sussex: Columbia University Press, pp. 21–51. doi:10.7312/zern10810-003.

Whyte, K.P. (2013) 'On the role of traditional ecological knowledge as a collaborative concept: A philosophical study', *Ecological Processes*, 2(7). doi:10.1186/2192-1709-2-7.