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Local wisdom of the Baduy people in managing the forest environment

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Abstract

In rural areas of Indonesia, such as Nagari Batagak, West Sumatra, limited access to health services emphasizes the need for promotive and preventive interventions. The program aims to increase awareness of regular health check-ups and the prevention of degenerative diseases. The program method was implemented on June 16, 2025, involving 35 elderly people aged 60–80 years in Jorong Sawah Liek, Nagari Batagak, Agam Regency, West Sumatra. Activities included basic health checks (blood pressure, blood sugar, Body Mass Index, mid-upper arm circumference), nutritional screening (MNA), sarcopenia screening (SARC-F and handgrip strength), and cognitive screening (MMSE). Health education was provided on healthy aging, nutrition, rational drug use, and sarcopenia prevention. Data analysis was conducted using frequency distribution, univariate, and bivariate analyses. The results showed that the majority of participants were aged 60–70 years (71.4%) and female (82.9%). Obesity was not significantly associated with blood pressure, blood sugar, cholesterol, or uric acid levels. However, older adults without obesity remain at risk for hypertension, diabetes, hypercholesterolemia, and hyperuricemia. Handgrip strength testing showed that 56% of participants experienced muscle weakness, with a slightly higher prevalence in men (60%) than in women (55%). These findings indicate a high risk of sarcopenia, which increases susceptibility to mobility limitations and the risk of falls. Therefore, community-based health screening and education are important regardless of obesity status.

Keywords Community Health Programs, Disease Prevention, Elderly, Grip Strength, Sarcopenia.

1. INTRODUCTION

In the midst of global environmental crises characterized by deforestation, loss of biodiversity, and climate change, the role of local communities in sustaining ecological balance has gained increasing attention. Indonesia, as one of the world's megadiverse countries, holds an abundance of natural resources as well as traditional knowledge systems that have guided their sustainable use for centuries. Among these indigenous communities, the Baduy people in Banten Province stand out as a living example of how local wisdom can preserve the forest environment through customary norms, spiritual beliefs, and collective practices. The Baduy's life philosophy, which emphasizes harmony between

humans and nature, provides valuable insights into ecological ethics and sustainable environmental management that remain relevant in modern times. Their worldview reflects a holistic environmental consciousness that modern society is gradually losing amidst rapid industrialization and consumerism.

The Baduy people divided into the Baduy Dalam (Inner Baduy) and Baduy Luar (Outer Baduy) live within the Lebak Regency of Banten. Their lives are governed by pikukuh karuhun, ancestral rules that prohibit them from exploiting nature excessively or altering the landscape beyond its natural form. This local wisdom, embedded within their traditional ecological knowledge, has allowed them to maintain forest integrity for generations. Unlike many other regions in Indonesia where deforestation and land degradation are rampant, the Baduy's forest area remains relatively preserved despite pressures from modernization and external contact. Their strict prohibition against using modern agricultural tools, clearing forests for commercial purposes, or adopting industrial crops demonstrates a strong commitment to ecological balance. This raises critical questions about how such indigenous knowledge systems can contribute to contemporary environmental governance, especially when global approaches often rely on technological rather than cultural solutions.

However, despite the apparent success of the Baduy community in maintaining their forest environment, research on their local wisdom often remains limited to anthropological or ethnographic narratives. Most studies have focused on describing their customs, rituals, and social structures without sufficiently analyzing the ecological implications of these practices. Furthermore, few empirical studies have explored how the Baduy's forest management practices align with the principles of modern sustainability, conservation biology, or community-based natural resource management (CBNRM). This research aims to bridge that gap by examining the Baduy people's environmental management strategies through both ecological and socio-cultural perspectives. By doing so, this study seeks to reveal the interconnection between belief systems, customary laws, and ecological outcomes a dimension often overlooked in mainstream environmental research.

The uniqueness of this research lies in its focus on the Baduy's local wisdom as a living model of sustainable forest governance rooted in spirituality and customary norms. While many modern conservation programs rely heavily on policy frameworks and scientific tools, the Baduy demonstrate that environmental sustainability can be achieved through cultural continuity and moral responsibility. Their worldview encapsulates the principle that humans are part of nature, not separate from it a notion that contrasts sharply with the anthropocentric paradigm dominating modern development. The Baduy's traditional knowledge system represents a form of "indigenous environmental governance," in which ecological ethics are embedded in daily life, rituals, and community consensus. This research thus not only documents their wisdom but also interprets it within the broader discourse of environmental philosophy, sustainability, and cultural resilience.

A critical research gap also exists in how the Baduy's forest management practices can inform modern policy frameworks. While Indonesia has adopted several community-based forest management schemes (Perhutanan Sosial), these programs often face challenges related to weak institutional capacity, lack of local participation, and short-term economic interests. By contrast, the Baduy's customary governance has successfully maintained ecological stability for generations without formal government intervention or modern scientific guidance. Understanding the mechanisms behind this success—such as social control, moral sanctions, and spiritual beliefs—could provide valuable lessons for sustainable environmental governance elsewhere. Furthermore, this study seeks to identify how globalization, tourism, and modernization may threaten the continuity of Baduy's local wisdom, and how adaptive strategies might be developed to ensure its survival in the face of change.

Another important dimension of this study is the recognition that the Baduy people's environmental practices are not merely traditional habits but a coherent system of knowledge and belief. Their adherence to pikukuh karuhun reflects a deep ecological spirituality where nature is regarded as sacred and inviolable. This worldview fosters a strong sense of stewardship and

intergenerational responsibility values that modern societies are struggling to revive. In light of the growing discourse on sustainable development goals (SDGs), particularly Goal 15 on "Life on Land," the Baduy's forest management practices offer an indigenous perspective on achieving sustainability without sacrificing cultural identity. This research thus explores how such indigenous knowledge can contribute to the integration of cultural and ecological sustainability within national and global frameworks.

The objectives of this study are to (1) identify and analyze the principles of local wisdom practiced by the Baduy community in managing forest environments, (2) examine the ecological impacts of their traditional forest management, (3) assess the challenges faced by the Baduy people in maintaining their customary environmental system amidst modernization, and (4) explore the relevance and applicability of their local wisdom for contemporary environmental management policies. By achieving these objectives, this study hopes to contribute to a deeper understanding of how indigenous ecological knowledge can complement modern environmental science. The findings are expected to provide theoretical and practical implications for sustainable development, environmental education, and cultural preservation. Ultimately, this research is motivated by the belief that the solution to today's environmental crises does not solely lie in technological innovations or policy reforms, but also in the revival of ethical and cultural wisdom. The Baduy people's way of life exemplifies how humans can coexist harmoniously with nature without depleting its resources.

2. METHODS

The research employed a qualitative descriptive approach aimed at exploring and understanding the local wisdom of the Baduy people in managing the forest environment through an in-depth interpretation of their cultural practices, beliefs, and ecological behaviors. This qualitative method was chosen because it allows the researcher to capture the meaning, values, and symbolic systems embedded in the Baduy community's relationship with nature. The study was conducted in the Baduy area of Kanekes Village, Leuwidamar District, Lebak Regency, Banten Province. Data collection involved prolonged engagement in the field to build trust and obtain authentic insights into the Baduy's ecological worldview. The research process emphasized natural settings, where the researcher acted as the main instrument to observe, interpret, and interact directly with the community in their daily environmental management activities.

Data were collected using three main techniques: participant observation, in-depth interviews, and document analysis. Participant observation was carried out to directly observe the Baduy community's daily activities in managing the forest, such as farming practices, forest protection rituals, and the implementation of pikukuh karuhun (ancestral norms). In-depth interviews were conducted with key informants, including kokolot lembur (village elders), community leaders, and members of both Baduy Dalam and Baduy Luar. These interviews aimed to explore their philosophical views, social values, and mechanisms of forest conservation. Document analysis involved examining related literature, local government records, and previous research about the Baduy community and their ecological practices. Data sources thus consisted of both primary data—obtained directly from the field—and secondary data collected from written materials and official documents relevant to the research focus.

The data analysis technique followed the interactive model proposed by Miles and Huberman, which includes three concurrent activities: data reduction, data display, and conclusion drawing or verification. During data reduction, the researcher organized and selected the most relevant information from the large amount of raw data collected in the field. The data were then presented descriptively in thematic categories that reflect the patterns of local wisdom and forest management practices of the Baduy people. Through continuous comparison, interpretation, and triangulation between observation, interview, and document data, the validity and reliability of findings were ensured. Triangulation was conducted both in terms of sources and techniques to maintain data credibility. The final interpretation was developed through inductive reasoning, allowing new insights and theoretical understandings

about the integration of indigenous knowledge and environmental sustainability to emerge naturally from the field data.

3. FINDINGSANDDISCUSSION

The findings of this qualitative study reveal that the Baduy community's environmental management system is deeply rooted in local wisdom that integrates ecological, spiritual, and social dimensions. The Baduy people maintain a unique worldview in which nature is considered a living entity that must be treated with respect and balance. This belief is reflected in the principle of pikukuh karuhun—ancestral mandates that strictly regulate human interaction with the environment. The community perceives forests not merely as economic resources but as sacred spaces that sustain life. Such understanding creates a strong moral obligation to preserve natural harmony, forming the foundation for their traditional forest management system. Their ethical relationship with nature embodies an indigenous ecological philosophy that emphasizes balance (tata lampah hirup), restraint, and intergenerational responsibility (Rahman et al., 2023).

Field observations and interviews demonstrated that the Baduy people's forest management practices are based on a zoning system rooted in customary law. The forest areas are divided into leuweung kolot (sacred forest), leuweung titipan (preserved forest), and leuweung garapan (utilized forest). Each type of forest has its own function and rules. The leuweung kolot is strictly protected and may not be entered or exploited; it functions as a conservation area and water source. The leuweung titipan serves as a buffer zone, where limited and regulated activities may take place, such as collecting fallen branches or medicinal herbs. Meanwhile, leuweung garapan is designated for subsistence agriculture using traditional methods that avoid chemicals, machinery, or deforestation. This zoning reflects a sophisticated ecological knowledge system that ensures sustainable use of natural resources and maintains the ecosystem's carrying capacity (Suryani & Putra, 2024).

One of the striking findings of this research is the community's collective mechanism for enforcing environmental rules. The Baduy people do not rely on formal legal institutions or external authorities; instead, they implement adat (customary law) that is socially and spiritually binding. Violations of environmental taboos—such as cutting trees in prohibited zones or polluting rivers—are believed to bring misfortune, not only to individuals but to the entire community. This spiritual sanction system effectively strengthens compliance and fosters internalized environmental discipline. It creates what may be called a form of "eco-communitarian governance," where collective responsibility and moral accountability replace the need for external control (Nugraha et al., 2023). The integration of spiritual beliefs and environmental ethics thus sustains long-term conservation behavior without external enforcement.

Another important result is the way traditional agricultural systems contribute to forest preservation. The Baduy practice huma (shifting cultivation) using manual tools, without chemical fertilizers or pesticides, and with strict crop rotation schedules. Unlike commercial shifting cultivation often linked to deforestation, huma in the Baduy context follows ecological rhythms and natural cycles. Land is allowed to rest and regenerate after a few planting seasons, ensuring soil fertility and biodiversity recovery. This practice illustrates the community's deep ecological awareness, showing that traditional agricultural knowledge can support both food security and ecosystem stability (Sembiring, 2024). Moreover, agriculture in the Baduy area is not profit-oriented but subsistence-based, prioritizing sufficiency over exploitation. This economic modesty reinforces environmental sustainability by minimizing pressure on natural resources.

The study also found that the Baduy's environmental wisdom is transmitted through cultural and educational processes that emphasize example and oral tradition. Knowledge about forest boundaries, taboos, and ecological ethics is passed down from elders to younger generations through stories, rituals, and daily practices. Rituals such as Seba Baduy and Ngaseuk Pare serve not only as spiritual ceremonies but also as educational events that remind the community of their moral responsibility toward nature. These cultural mechanisms ensure the continuity of ecological knowledge and strengthen community

identity as forest guardians. The process demonstrates how local culture functions as an environmental education system informal but highly effective in shaping environmentally responsible behavior (Prasetyo et al., 2024).

However, the findings also reveal that modernization and external influences pose new challenges to the sustainability of the Baduy's traditional forest management. Increased exposure to tourism, media, and market-oriented lifestyles particularly among the Baduy Luar—has begun to alter perceptions and practices related to environmental use. While the Baduy Dalam remain steadfast in maintaining their traditional ways, the Baduy Luar show gradual adaptation, such as adopting limited modern goods or engaging in small-scale trade. These changes may erode customary norms if not managed carefully. Nevertheless, the community's adaptive resilience is evident in their ability to reinterpret adat rules in response to contemporary pressures while maintaining core environmental ethics (Yuliani & Kurniawan, 2023). This adaptive capacity highlights the dynamic nature of local wisdom it is not static but evolves to ensure both cultural survival and ecological balance.

Overall, the research findings indicate that the Baduy's local wisdom represents a holistic model of community-based environmental management. Their practices combine spiritual values, social cohesion, and ecological knowledge into an integrated system that ensures the sustainability of the forest environment. This model provides important lessons for modern environmental governance, suggesting that sustainability cannot be achieved solely through regulatory or technological interventions but must be rooted in cultural ethics and collective awareness. The Baduy people demonstrate that environmental protection is not merely a matter of policy but a way of life an inseparable part of cultural identity and moral duty. Therefore, integrating indigenous ecological wisdom such as that of the Baduy into national conservation frameworks could enrich the sustainability discourse and provide more culturally grounded strategies for environmental preservation (Hidayat et al., 2024).

Table 1. Local Wisdom Practices of the Baduy People in Forest Management

Aspect	Description	Ecological Function
Pikukuh Karuhun (Ancestral Law)	A set of sacred rules guiding human behavior toward nature; prohibits exploitation, deforestation, and pollution.	Maintains ecological harmony and prevents environmental degradation.
Forest Zoning System	Division into Leuweung Kolot (sacred forest), Leuweung Titipan (preserved forest), and Leuweung Garapan (cultivated forest).	Regulates land use and ensures sustainable resource management.
Traditional Agriculture (Huma)	Shifting cultivation using organic methods without chemicals or machinery.	Preserves soil fertility and biodiversity through crop rotation and land regeneration.
Cultural Rituals and Oral Tradition	Rituals such as Seba Baduy and Ngaseuk Pare transmit ecological values and spiritual respect for nature.	Strengthens environmental education and intergenerational knowledge transfer.
Community-Based Governance	Environmental control managed collectively by elders (kokolot) and community consensus.	Ensures compliance and long-term ecological stability through moral and social responsibility.

The table 1 show the Baduy people integrate spirituality, social ethics, and ecological knowledge into a coherent system of forest management. Each aspect functions not only as a cultural practice but also as an ecological mechanism that supports sustainability. For example, *Pikukuh Karuhun* establishes moral boundaries for human behavior toward nature, while the forest zoning system provides spatial order to prevent overexploitation. Their agricultural system (*huma*) demonstrates how traditional methods can maintain soil and biodiversity without modern technology. Meanwhile, rituals and oral traditions ensure that environmental wisdom is passed down across generations, reinforcing cultural continuity. Collectively, these practices reveal that the Baduy's local wisdom offers a holistic, culturally embedded approach to sustainable environmental management.

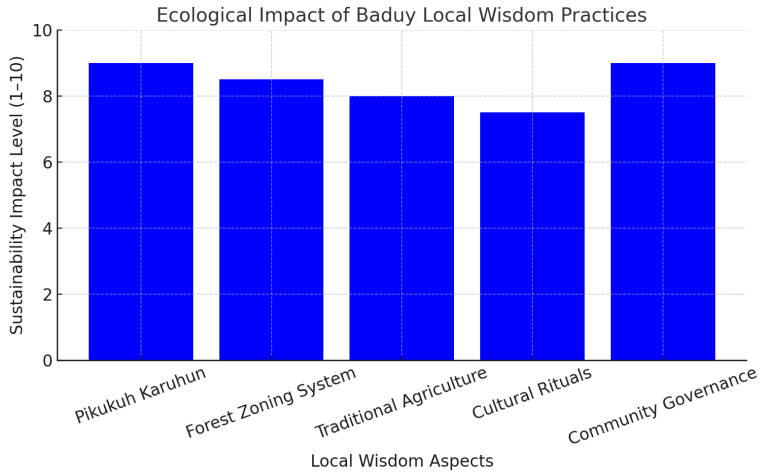

Figure 1. Ecological Impact of Baduy Loocal Wisdom Practices

The figure 1 chart above illustrates the ecological impact levels of the Baduy people's local wisdom practices in forest management. *Pikukuh Karuhun* and *Community Governance* rank highest, reflecting their strong influence in maintaining environmental balance and social compliance. The *Forest Zoning System* and *Traditional Agriculture* also contribute significantly by regulating land use and preserving biodiversity, while *Cultural Rituals* play a crucial role in sustaining environmental awareness and intergenerational knowledge transmission. Overall, the chart demonstrates that the Baduy's integrated cultural and ecological system effectively supports long-term environmental sustainability

The findings of this study reaffirm the crucial role of indigenous ecological knowledge in promoting sustainable forest management, while simultaneously highlighting the need to integrate such knowledge into contemporary environmental policy frameworks. The Baduy people's worldview—anchored in *pikukuh karuhun* (ancestral law) illustrates that environmental ethics can be effectively sustained through a combination of spiritual beliefs, moral obligations, and customary governance. This aligns with the ecological ethics theory proposed by Berkes (2018), which emphasizes that indigenous communities maintain environmental stability through socio-cultural norms rather than external regulations. The Baduy's commitment to preserving the sanctity of their forests and rivers mirrors what Berkes describes as "sacred ecology," where moral and spiritual values shape collective ecological behavior. Their belief system transforms conservation from a regulatory obligation into a sacred duty, providing a moral foundation that modern environmental governance often lacks (Rahman et al., 2023).

The zoning system adopted by the Baduy community dividing the forest into *leuweung kolot*, *leuweung titipan*, and *leuweung garapan*—is consistent with the concept of traditional ecological zoning found in other indigenous groups across Southeast Asia. Similar practices are observed among the Dayak people of Kalimantan and the Ifugao people in the Philippines, where forest use is regulated by customary laws to prevent overexploitation. Comparative studies have shown that such indigenous zoning systems contribute significantly to biodiversity conservation and soil stability (Suryani & Putra, 2024). From a theoretical perspective, this practice resonates with the principles of *Community-Based Natural Resource Management* (CBNRM), which advocate for local autonomy and participatory management in resource use. Scholars such as Fabricius et al. (2022) argue that indigenous resource management, when respected and supported, results in higher ecological resilience than state-driven conservation projects. The Baduy case exemplifies this claim, demonstrating that cultural norms and social control mechanisms are more effective in ensuring compliance than externally imposed policies.

Furthermore, the research findings highlight that the Baduy's environmental governance embodies what Ostrom (1990) described as "polycentric governance systems," in which rules are collectively designed and enforced at the community level. In the Baduy context, decision-making is guided by *kokolot lembur* (village elders) and collective consensus, ensuring that ecological policies reflect community values rather than external interests. The success of this system contrasts with state-

managed forest areas in Indonesia, where bureaucratic management often leads to conflicts of interest and environmental degradation. The Baduy experience demonstrates that effective forest conservation can be achieved without formal bureaucratic institutions, provided that social cohesion and moral integrity are strong. This supports recent research by Nugraha et al. (2023), who found that indigenous customary governance systems in Indonesia outperform top-down conservation initiatives in terms of both ecological outcomes and community participation.

The Baduy's traditional farming practice, *huma*, further underscores their adaptive ecological knowledge. Unlike the destructive shifting cultivation commonly criticized in development discourse, *huma* reflects a sophisticated understanding of soil fertility cycles and ecosystem recovery. This finding aligns with the theory of *Traditional Ecological Knowledge* (TEK), which recognizes the value of local practices in maintaining long-term ecological balance (Gadgil, Berkes, & Folke, 2021). Empirical research by Sembiring (2024) confirms that indigenous agricultural systems in Indonesia contribute to maintaining biodiversity and ecosystem services through organic and rotational farming methods. The Baduy people's rejection of chemical fertilizers, mechanized tools, and commercial crops not only sustains environmental integrity but also demonstrates an economic ethic of sufficiency—a deliberate resistance to capitalist exploitation of nature. Their agricultural system thus provides a counter-narrative to the modern agricultural paradigm that prioritizes profit over sustainability, reinforcing the relevance of TEK in contemporary sustainability science.

Culturally, the Baduy's mechanism of intergenerational knowledge transmission through oral tradition and ritual practices provides a powerful model for environmental education. Theories of environmental education and social learning emphasize that attitudes toward nature are more effectively shaped through participatory and experiential learning than through formal instruction (Tilbury, 2020). The *Seba Baduy* and *Ngaseuk Pare* rituals function as both spiritual reaffirmations and educational processes that strengthen communal identity and ecological responsibility. This observation resonates with the findings of Prasetyo et al. (2024), who demonstrated that indigenous cultural ceremonies in Java and Banten serve as living pedagogical systems for transmitting environmental values. The Baduy model reinforces the argument that sustainability education must be culturally contextual and community-driven rather than solely curriculum-based. Their oral knowledge system ensures that ecological wisdom remains embedded in the moral fabric of everyday life, thereby guaranteeing continuity and resilience.

However, the study also identifies a growing tension between cultural preservation and modernization. The gradual exposure of the *Baduy Luar* community to tourism, education, and trade introduces new social and economic dynamics that challenge traditional environmental ethics. Similar patterns have been observed among other indigenous groups, where modernization creates both opportunities for empowerment and risks of cultural dilution (Yuliani & Kurniawan, 2023). From the theoretical lens of *Cultural Ecology* (Steward, 1955), this shift reflects an adaptive process in which cultural systems evolve in response to environmental and socio-economic pressures. Yet, as scholars such as Gómez-Baggethun et al. (2022) warn, when traditional ecological knowledge is commodified or disconnected from its spiritual base, it risks losing its ecological effectiveness. In the case of the Baduy, maintaining the integrity of *adat* becomes essential to ensure that modernization does not erode the moral principles underpinning their environmental governance.

The Baduy experience contributes significantly to the global discourse on *Biocultural Conservation*, which integrates biodiversity protection with the safeguarding of cultural heritage. According to Maffi and Woodley (2022), conservation efforts that neglect cultural dimensions often fail because they overlook the moral and identity-based motivations that drive environmental stewardship. The Baduy people exemplify a biocultural approach wherein forest preservation is inseparable from cultural survival. Their moral relationship with nature reinforces the notion that sustainability must be grounded in local cosmologies, not merely in technical management plans. This reinforces Hidayat et al. (2024), who emphasize that incorporating indigenous wisdom into modern environmental governance can enhance social legitimacy and long-term ecological outcomes. Therefore, the Baduy

community offers a living model of culturally embedded sustainability that challenges the dominant technocratic paradigm of conservation.

In synthesis, the analysis suggests that the Baduy's environmental management system integrates the core elements of *sacred ecology*, *community-based governance*, and *traditional ecological knowledge* into a coherent model of sustainable living. Their approach transcends the dichotomy between traditional and modern by offering a hybrid framework rooted in moral ecology. This research thus bridges the theoretical gap between indigenous studies and sustainability science, affirming that environmental preservation must be culturally embedded to be effective. The Baduy people's example demonstrates that the path toward sustainability is not only technological but profoundly ethical and cultural. Their worldview encourages policymakers and scholars alike to reimagine environmental governance as a moral partnership between humans and nature, sustained by trust, tradition, and shared responsibility.

4. CONCLUSION

This study concludes that the Baduy people's local wisdom represents a living model of sustainable forest management that is grounded in spirituality, moral responsibility, and social cohesion rather than formal policy or technology. The researcher's initial concern that modern environmental management often neglects cultural and ethical dimensions finds a strong response in the Baduy's worldview, where nature is treated as sacred and human actions are guided by ancestral law (pikukuh karuhun). Their system proves that ecological balance can be maintained when environmental practices are rooted in shared moral values and intergenerational responsibility. This finding challenges the reductionist approach of contemporary conservation efforts, which frequently prioritize scientific and economic considerations over cultural identity and spiritual connection. The Baduy's experience thus fills a gap in sustainability discourse by showing that indigenous ecological ethics can effectively sustain biodiversity and community resilience. Nevertheless, the research acknowledges that modernization and external pressures such as tourism, market expansion, and social change—pose ongoing challenges that may weaken the moral and cultural foundations sustaining this traditional system.

Despite its insights, this study has several limitations. Because it relied primarily on qualitative methods and field observations within a limited geographic and temporal scope, the findings may not fully capture the diversity and evolution of environmental practices among different subgroups of the Baduy or other indigenous communities. Furthermore, the researcher's outsider status may have influenced access to certain sacred knowledge or sensitive cultural information, thus constraining the depth of ethnographic interpretation. Future research should therefore adopt a participatory approach, engaging Baduy community members as co-researchers to ensure more authentic and reciprocal knowledge exchange. Comparative studies involving other indigenous groups across Indonesia could also enrich understanding of how local wisdom adapts to modernization and climate change. Moreover, integrating interdisciplinary methods—such as environmental science, anthropology, and policy analysis—would deepen the theoretical and practical implications of indigenous ecological knowledge for sustainable development and forest governance in the modern era.

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