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Legal Policy of Forest Management in Indonesia through Local Wisdom and Traditional Ecological Knowledge

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Abstract

The purpose of this study is to examine forest management laws from a local wisdom perspective, with the goal of protecting biodiversity and maintaining the functions of forest ecosystems. Therefore, effective local wisdom legal policies are needed to improve sustainable forest management in Indonesia. A literature review is the research methodology employed to explore literature related to good forest governance and forestry legal policy in Indonesia. The results of this study indicate that the existing legal framework often fails to guarantee the equitable distribution of resources, the recognition of indigenous peoples' rights, substantial public involvement, and skills improvement across all ecosystem components. Due to regulatory uncertainty, tenurial disputes between local communities and indigenous peoples persist, often involving government agencies and businesses, and public involvement remains limited. Awareness and recognition of the inseparable interaction between organisms and their surroundings underscore the importance of traditional ecological knowledge in emphasizing the unity of all elements that live, grow, and develop together on planet Earth. For this reason, a local wisdom legal policy construction model is needed that describes how to care for forests and natural resources connected to the landscape through a Co-management model by synergizing and integrating Traditional Ecological Knowledge (TEK) into forest management policies.

Keywords

Forest Management; Legal Policies; Local Wisdom; Traditional Ecological Knowledge

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1. INTRODUCTION

In September 2023, thousands of people protested in front of the Batam Development Authority (Badan Pengusahaan Batam) in response to the proposed land clearing for the Rempang Eco City project, a state-supported industrial, trade, and tourism initiative that incorporates foreign investment, but was designed without in-depth local consultation (Kurniawan, 2025). They called for the suspension of the relocation of roughly six villages, arguing that the removals had been conducted without proper legal procedures. The protests resulted in the arrest of 43 people accused of vandalism and violence against officers. (Solidaritas Nasional Untuk Rempang, 2023)

The previous incident exemplified the unrest that arises from government policymaking that fails to accommodate local wisdom, the rights of indigenous communities, and social issues (Kurdi et al., 2025). For indigenous communities, mining and logging operations (many of which are prohibited) create serious social, economic, and legal issues (Rohmy et al., 2024). Approximately 943 square miles (2,442.4 hectares or 2,442,370 square meters) of customary forest are recognized by the government for 141 villages.

Nonetheless, customary forest rights may be asserted across more than 80,500 square miles (208,495,000 square meters or 20,849.5 hectares) of forest land, according to the nonprofit Ancestral Domain Registration Agency. In Kalimantan, the government formally acknowledged the rights of fifteen indigenous Dayak communities to 270 square miles (699,300 square meters or 69.93 hectares) of customary forest. This is the greatest customary forest area the state has ever acknowledged. Additionally, in 2022, the government formally awarded seven Indigenous Papuan communities customary forest rights to 155 square miles (401,450 square meters or 40,145 hectares) of customary forest in eastern Papua. (Elisabeth & Jong, 2022)

There are between 50 and 70 million indigenous people in the nation, according to Aliansi Masyarakat Adat Nusantara, the Indigenous Peoples' Alliance of the Archipelago. These communities include 312 legally recognized indigenous groups in Papua, families who live as maritime nomads, and the Dayak people of Kalimantan. However, the government has consistently failed to stop businesses from invading the territory of indigenous peoples (US Department of State, 2025). Additionally, central and regional government officials are also suspected of accepting bribes from agricultural and mining corporations in exchange for land access, often at the expense of native communities. (Rohmy & Nihayaty, 2023)

The International Working Group on Indigenous Affairs reported 19 cases of customary land acquisition in 2022, along with territorial disputes covering approximately 2,300 square miles (5,957,000 square meters or 595.7 hectares). Systematic efforts to undermine the customary rights of indigenous peoples have long been ongoing. Even after decades, the Pargamanan-Bintang Maria village and twenty-three other Toba Batak groups in North Sumatra are still at odds with Toba Pulp Lestari, a paper manufacturer, over land claims. Although the government acknowledges the customary forest rights of six Toba Batak groups, it has not confirmed the Pargamanan community's assertion that Toba Pulp Lestari occupies 40% of their territory. (US Department of State, 2022)

Local communities have their own effective ways of maintaining land and natural resources, often due to a spiritual or religious connection to the forest (Dinçel & Yıldız, 2025). Scholars emphasized that law should be derived from customs and develop naturally, rather than being imposed by certain authorities (Budiharta & Holl, 2025). Local wisdom can be considered an integral part of forestry

governance, particularly for communities that have long lived around the forest (Wibisono, 2024). Based on these facts, this study examines the extent to which Indonesian forest management policies are viewed from the perspective of Local Wisdom and Traditional Ecological Knowledge. This research is important because laws regarding forests and the environment must provide benefits to indigenous people, nature, and the state in a balanced manner.

2. METHOD

This study uses a phenomenological method and a qualitative research strategy to investigate how Indonesian forest management legal policies reflect local wisdom and Traditional Ecological Knowledge (TEK). Phenomenology in this study functions primarily as an interpretive lens rather than a mere descriptive framework (Cotterrell, 2023). It enables the researcher to interpret the lived experiences and perspectives of indigenous and local communities as they relate to ecological law, traditional practices, and environmental governance. Through this interpretive stance, the study seeks to understand how legal frameworks interact with socio-cultural norms embedded in local wisdom.

In addition, this study examines several concrete cases in Indonesia as phenomenological reference points for understanding the relationship between forest management policies, local wisdom, and the lived experiences of indigenous communities. These cases include, among others, the Rempang conflict and various issues affecting Dayak communities in Kalimantan, which illustrate the tensions between state-led development projects, corporate interests, and the customary rights of local communities over their ancestral territories. The use of these cases is not intended as empirical fieldwork but rather as embedded illustrations that help validate the literature, enrich the interpretive process, and clarify how the experiences of affected communities can be connected to the phenomenological legal framework and the principles of Traditional Ecological Knowledge (TEK). Thus, the case references serve as contextual examples that strengthen the thematic synthesis within this literature-based study.

The study gathers and examines pertinent scholarly and legal materials using a methodical literature review approach. Literature was selected based on the following criteria: first, relevance to forest management, environmental law, and local wisdom; second, publication within the last ten years to ensure contextual accuracy, except for several seminal works considered foundational (Littlejohn & Foss, 2005); third, publication in peer-reviewed journals or by reputable institutions; and fourth, specific attention to empirical studies, government reports, and jurisprudential analyses addressing the relationship between law and indigenous ecological knowledge. Besides that, some regulations that are observed in the research, such as the Republic of Indonesia's State Regulations, discussed in Article 6 of Law No. 6 of 2023 concerning the Stipulation of Government Regulation instead of Law No. 2 of 2022 concerning Job Creation, address the environment, forestry, and conservation of natural resources and

ecosystems.

The primary sources of data include Indonesian forestry and environmental regulations, national and regional legal policies, academic journal articles, case reports, and international studies concerning ecological justice and the integration of TEK into environmental governance. The collected literature was analyzed through a thematic synthesis consisting of three main stages: identifying recurring legal, ecological, and cultural themes; categorizing these themes into conceptual clusters such as participation, recognition, and justice; and interpreting their interrelations within the framework of phenomenological legal understanding.

3. FINDINGS AND DISCUSSION

This study positions the SETS-Justice framework as an analytical tool that examines the interaction between social dynamics, ecological conditions, and technological infrastructures within the context of Indonesia's forest governance. The research employs this framework to examine how the distributive justice, recognition, participation, and capability dimensions influence policy outcomes for indigenous communities.

The analysis situates these dimensions within Indonesia's broader legal and environmental landscape to highlight structural patterns that influence ecological justice. By grounding the framework in specific socio-environmental settings, the study establishes a clear foundation for assessing how legal norms and traditional knowledge intersect with contemporary environmental challenges. To strengthen the analytical clarity and practical relevance of this research, the study applies the Social-Ecology-Technology System (SETS-Justice) framework to one or two concrete Indonesian cases—particularly the Rempang conflict and forest management issues involving Dayak communities in Kalimantan. These cases serve as empirical anchors, illustrating how ecological justice dimensions and SETS interactions manifest in real socio-legal contexts, thereby demonstrating the operational value of the framework.

Furthermore, to distinguish descriptive exposition from normative argumentation, the subsequent *Findings and Discussion* section is organized with explicit analytical signposting. Descriptive subsections outline the legal, ecological, and cultural realities derived from the literature. In contrast, normative subsections articulate the implications of these findings for legal reform, ecological justice, and the integration of Traditional Ecological Knowledge (TEK). This structural distinction ensures conceptual precision and enhances the interpretive coherence of the overall analysis.

3.1. Legality

Building on the methodological orientation and the contextual cases previously outlined, this section examines how Indonesia’s legal framework engages with the principles of local wisdom as a foundation for forest governance. The discussion situates statutory regulations alongside customary

practices to illustrate the coexistence (and frequent tension) between state law and indigenous normative systems. By situating these legal dynamics within the broader socio-ecological context, this section provides a crucial conceptual foundation for understanding the normative challenges examined in the subsequent analysis. (Suprianik, 2023)

In real life, tensions often arise between two legal systems: formal and rigid national law and flexible and contextual customary law (Manse, 2024). Therefore, Hans Kelsen explicitly explained the importance of a legal system in regulating customary law communities. A legal system must incorporate various interconnected norms in accordance with its principles and provisions. These norms, each with its own characteristics, will synergize in building a national legal system. (Adji Samekto, 2025)

Customary law has been practiced in various forms of local wisdom even before Indonesia's independence. Furthermore, customary institutions remain alive and function as part of the social structure of society to this day (Emmanuel Olawale et al., 2024). Constitutional law expert Fahri Bachmid views local wisdom as an essential element that must be integrated into the legal system and state policies, in addition to being a cultural heritage. Friedrich Carl von Savigny emphasized that law should be born from customs and develop naturally, rather than being imposed by certain authorities; thus, local wisdom plays a vital role in shaping the spirit of the Indonesian constitution.

In the customary law system, conflict resolution is carried out through a participatory deliberation mechanism that emphasizes the restoration of social relations rather than merely punishing the offender. Customary law is unwritten, morally and socially binding, and provides a sense of justice adapted to local values, social contexts, and communal norms. (Quince, 2026)

However, within the framework of a modern rule of law, customary law often faces challenges when confronted with the formal national legal system. When national law is rigidly applied in a region, normative and institutional conflicts frequently arise (Lunstrum & Havice, 2025). For example, cases such as land disputes, customary violations, or inheritance disputes that have been resolved through customary law are still prosecuted criminally by law enforcement officials, creating tension between local communities and state institutions.

Furthermore, law enforcement officials often lack cultural sensitivity or sufficient knowledge of the local context, resulting in their approaches being deemed inappropriate and even exacerbating sensitive social situations. These jurisdictional conflicts demonstrate that legal pluralism, the existence of more than one legal system within a single region, requires a more inclusive and adaptive legal policy strategy.

Recognition of customary law has actually been stated in Law Number 6 of 2014 concerning Villages, as well as Article 18B paragraph (2) of the 1945 Constitution, which affirms that the government acknowledges and honors the integrity of customary law communities along with their

traditional rights. Therefore, concrete strategies to bridge the gap between customary law and national law must be implemented, such as through the strengthening of regional regulations (Regional Regulations) that explicitly recognize the presence of traditional institutions and indigenous mechanisms for resolving disputes.

Another important aspect is contextually based legal education. The legal education curriculum in Indonesia should include material on legal pluralism, legal anthropology, and a deeper understanding of customary law, enabling prospective law enforcement officers to develop a broader and more inclusive perspective on the legal systems within their communities (Irianto, 2021). Integrating local wisdom and national law through progressive legal policies that incorporate local community participation will be a strategic step toward achieving substantial and sustainable justice in other customary areas in Indonesia. (Ariyadi, 2022)

Furthermore, Lon Fuller, in "Principles of Legality," formulated the concept of internal morality (Schneiderman, 2024). This meta-norm serves as a foundation for establishing legal regulations in the forestry and environmental sectors. The Principle of Forest Protection, as a parameter for a norm "on the right track," is an integral part of good forestry governance; its implementation is key to reducing forest destruction. Overall, the interaction between national legal instruments and customary law traditions reveals a complex landscape in which local wisdom serves both as a source of legitimacy and as a contested domain within the policy implementation process.

This complexity underscores the need to analyze local wisdom not only as cultural heritage but also as a functional component of ecological governance. Consequently, the following section turns to the conceptual and practical dimensions of Traditional Ecological Knowledge (TEK), illustrating how indigenous knowledge systems reinforce, challenge, or complement formal legal mechanisms in Indonesia's forest management policies.

3.2. Customary Rights

Following the examination of Indonesia's legal framework and its engagement with customary norms, this section explores how local wisdom is embedded within the broader construct of Traditional Ecological Knowledge (TEK). By situating local wisdom as an epistemic foundation that shapes community–environment relationships, this discussion extends the previous legal analysis into the cultural and cognitive domains that influence ecological governance (Kissiya & Biczó, 2025). This conceptual transition highlights that understanding TEK is essential not only for recognizing indigenous rights but also for appreciating the ecological rationality underlying traditional practices.

Local wisdom is understood as encompassing local policy, indigenous knowledge, and local genius. Local genius itself refers to a community's capacity to withstand external cultural influences,

absorb certain external elements, integrate those elements into its own cultural system, and regulate them. It also denotes the ability to guide and shape cultural development (Firdaus & Wandira, 2022). The strong dimension of the past in the discourse and construction of local wisdom means that efforts to explore, map, and reconstruct local wisdom often begin with examining myths about origins and other myths that form the basis for the community's local knowledge (Afrianti, 2020). Thus, it is unsurprising that local wisdom is linked to the collective intellect of particular ethnic groups, shaped and refined through their accumulated communal experiences. (Kuswandi & Ikmayadi, 2023)

Local wisdom is grouped into five categories, they are; first, outlook on life (philosophy); second, social attitudes, advice and wisdom expressed in the form of proverbs, parables, poetry or folklore; third, traditional ceremonies; fourth, principles, norms, and rules that are embodied in social systems; and fifth, habits, daily behavior in social interactions (Akmal et al., 2025). Additionally, natural resource conservation and preservation, human resource development, cultural and scientific advancement, advice, beliefs, literature, and taboos, methods of forming and constructing communal integration, ethical and moral foundations, and political functions are just a few of the significant roles and functions of local wisdom. (Rohmy et al., 2021)

The environment significantly influences the cultural formation of Indigenous groups, as forest-dwelling communities develop traditional local wisdom through their continual and repeated interactions with forest ecosystems and resources (Rahmawati, 2015). Forest management policies and practices need to be more sensitive to the ever-changing relationships between natural communities and the internal dynamics of indigenous communities (Hariram et al., 2023). Thus, local communities also need to possess a set of specialized, holistic strategic knowledge to negotiate future projects that may impact environmental sustainability. (Maclean, 2015)

Rules regarding culture, traditional society, and nature have been stipulated in the law. The provisions of Article 18 B paragraph (2) of the 1945 Constitution are strengthened by the provisions of Article 28I paragraph (3) of the 1945 Constitution that cultural identity and traditional society are respected in line with developments in times and civilization. This clause recognizes and safeguards the presence of customary forests within the traditional territories of indigenous groups. This is a result of customary law's long-standing status as a "living law," which remains in effect today. Thus, it is disrespectful to the rights of indigenous tribes to include customary woodlands in state forests.

In interpreting Article 18B paragraph (2) of the 1945 Constitution, Jimly Asshiddiqie stated that it is crucial to remember that the state recognizes (a) the existence of a customary law community and the traditional rights it possesses; (b) the existence of customary law community units; (c) the customary law community is still alive; (d) in its unique environment (lebensraum); (e) such recognition and respect are given without ignoring the standards of appropriateness for humanity in accordance with

the level of development of the nation's existence; and (f) such recognition and respect must not diminish Indonesia as a unitary state in the Republic of Indonesia. A fundamental idea or foundation of customary law, this clause recognizes and respects customary law groups (adat rechtgemeenschappen).

Peleltier, Gelinas, and Potvin, in their research in Panama, found that the involvement of indigenous communities with the use of clear customary rules can provide benefits for local communities, such as for food security, nature conservation, and finding wise, effective, and sustainable strategies in managing natural resources (Setiawan et al., 2025). Scholars emphasized that the integration of Traditional Ecological Knowledge (TEK) from indigenous and local communities plays a crucial role in developing forest conservation policies and addressing climate change. TEK provides a holistic perspective and practical solutions on the ground, while respecting community sovereignty and perspectives in a fair, inclusive, and sustainable manner. (Baxter, 2005; Chervier et al., 2025)

The "Siriah ka Sidang" tradition in Nagari Pasia Laweh serves as a customary mechanism for sustainable forest use, fostering collective ecological awareness, and strengthening customary law. For this success, Pasia Laweh received the 2023 Nature Conservation Award, while the 2025 Focus Group Discussion (FGD) confirmed that the tradition embodies ecological knowledge, is grounded in customary law, and reflects community-based forest management, thus serving as an inspiring model for nature conservation based on local wisdom. (Abdurrahman, 2015)

Traditional Ecological Knowledge (TEK) is not merely a system of knowledge and action; it is a comprehensive framework that encompasses both knowledge and action. However, an integrated system of knowledge, action, and belief aimed at not exploiting and controlling their natural environment as freely as possible. (Berkes, 1999)

Additionally, this integration takes into account several dimensions: relationships based on the principle of reciprocity and obligations for both community members and other living beings; cosmologies or worldviews that diverge from modern science, of which ecology is a part; communal natural resource management institutions based on shared knowledge and meaning; and symbolic meaning through oral history, place names, and spiritual relationships. This is not only related to knowledge but also ecological interests such as natural resource management, conservation, and others. (Indrawati, 2023)

The interwoven elements of local wisdom and TEK demonstrate that indigenous ecological knowledge constitutes a dynamic and holistic system capable of informing sustainable resource management (Varghese & Crawford, 2021). The insights from this conceptual discussion provide a necessary backdrop for understanding how co-management models can integrate TEK with state policies to promote ecological justice. Accordingly, the next section examines the practical application

of TEK within collaborative governance frameworks, emphasizing how shared decision-making can bridge traditional practices and modern regulatory structures.

3.3. Ecological Justice

Building on the conceptual understanding of local wisdom and Traditional Ecological Knowledge (TEK), this section examines how these knowledge systems are operationalized through co-management practices in forest and natural resource governance. The discussion transitions from theoretical foundations to applied mechanisms, illustrating how collaborative arrangements between the state, indigenous communities, and other stakeholders translate TEK principles into practical management strategies. This progression underscores the importance of shared authority and reciprocal learning in achieving ecologically and socially sustainable outcomes.

The co-management model that synergizes Traditional Ecological Knowledge (TEK) into sustainable forest and other natural resource management policies is an approach that integrates local wisdom with scientific knowledge to produce more effective and equitable management strategies, which respect the rights of indigenous and local communities and increase ecological and social resilience (Rohman et al., 2024). The following Integrated Ecological Justice Dimensions Table and Social-Ecology-Technology System (SETS-Justice) framework serves to assess the extent to which natural resource management policies are fair to humans, beneficial to nature, and well-supported by technology.

Table 1. Integrated Ecological Justice Dimensions Table and Social-Ecology-Technology System (SETS-Justice) Framework (Pineda-Pinto et al., 2021)

Dimensions of Ecological and Social Justice, Ecology, Technology (SET)	**Parameter**	**Indicator**
Distributive Justice in Social Ecology and Technology	Distributional interactions between socioeconomic activities and ecological integrity: ecosystem services and distribution of benefits, (inequitable) access in forest management and utilization	1. What percentage of forest habitats have been restored due to mining and former plantations? 2. Communities and infrastructure are affected by environmental hazards (e.g., floods, landslides, forest fires).

	(corporations with local/indigenous communities), and the impact of natural disasters.	3. In terms of ecosystem distribution equity, what percentage of land management differs between communities and corporations?
	Distributional interactions between ecological integrity and technological infrastructure activities: Forest and environmental degradation due to plantation, mining, and infrastructure industrial activities.	1. Interference due to industrial plantation and mining activities on habitat settings (e.g., endangered animals, trees, and other species). 2. Impacts of granting land clearing permits for mining and plantation industries, including direct impacts on indigenous peoples and local communities (e.g., indicators of changes in livelihoods and housing). 3. Impacts of mining and land burning activities that emit pollutants and can harm health and the environment (e.g., the number of emission points, the total amount of pollutants, and the density of activities hazardous to human health and ecosystems).
	Interaction of Technological Infrastructure Distribution with Socioeconomic Activities: Pollution Exposure Due to Forest Land Use and Access Inequality.	1. Impacts on infrastructure and basic services (e.g., damaged roads, difficulty accessing clean water, polluted air). 2. Indicators of water, soil, and air quality due to changes in forest land for mining and plantation industries, etc. 3. Health impacts due to exposure to toxic pollutants (e.g.,

		hospitalizations for respiratory problems due to poor air quality, illnesses due to water contaminated with mercury).
Recognition in Social Ecology and Technology	Interaction of recognition between norms, behavior, values, and needs of indigenous forest communities/local communities, and ecological integrity: Plans to save species, devalue ecosystems, improve ecological awareness and attitudes toward ecological systems, and reduce the dangers associated with using forest land for plantation and mining operations.	1. Criteria used to determine the ecological value and need to protect forest areas (e.g., intrinsic value versus natural benefits to humans, species, or ecosystem services). 2. Number of protection programs within the forest area.
	Interaction between ecological integrity and technology-infrastructure activities: Recognizing the risks and threats of forest land use infrastructure for mining and plantation industries to enhance ecological resilience and integrity.	1. Types of environmental impacts and benefits considered in planning forest land use infrastructure for the mining and plantation industries (e.g., factors considered or ignored in environmental impact analyses). 2. Forest areas that require environmental improvement due to industrial activities such as past or present use of forest land for mining and plantation industries, etc., or poor soil and/or water quality (e.g., percentage of areas marked for restoration, number of locations).

	Interaction between the recognition of norms, behavior, values, and needs of local and indigenous communities regarding technological infrastructure, such as the use of forest land for mining and plantation industries. Recognition of the risks and threats of technology and infrastructure towards local community groups and devalued indigenous communities.	1. The number of forest land use plans for mining and plantation industries, etc. (e.g., are forest land use plans for mining and plantation industries, etc., implemented in a region well-socialized or vice versa). 2. Types of complaint services and risks related to forest land use for mining and plantation industries, etc.
Participation in Social Ecology and Technology	Participatory interactions between indigenous peoples/local communities, and ecological systems: Involvement of indigenous forest communities in environmental protection, citizen science projects, and representation of nature in decision-making processes.	1. The extent of involvement of indigenous peoples/local communities in advocacy efforts for forest utilization, management, and protection. 2. The socio-ecological impacts of forest land use for mining and plantation industries, etc., on indigenous peoples/local communities.
	Participatory interaction between indigenous peoples/local communities, ecological systems, and technology-infrastructure development: from the use of forest land for mining and plantation industries, to integrating decision-making processes, and the concept of an	3. The amount of forest land used for mining and plantation industries, etc. 4. Life cycle assessment of indigenous forest communities and local communities from the use of forest land for mining and plantation industries, etc.

	ecological approach.	
	Participatory interaction between social and indigenous groups, facilitated by the development of technology infrastructure, reflects the needs and aspirations of indigenous communities. This interaction is driven by the use of forest land for mining and plantation industries, among other factors.	1. Number of indigenous groups conducting advocacy. 2. The socio-technical influence and impact of forest land conversion for mining and plantation industries, etc., on the continued existence of indigenous communities.
Capabilities in Social Ecology and Technology	The interaction of capabilities between social groups and ecological capacity. Social vulnerability (negative), ecosystem and species vulnerability, habitat restoration to improve ecosystem function, biodiversity, and overall human and natural health and quality; the needs of human and non-human species and their interrelationships, mechanisms for detecting and preventing risks and hazards from the use of forest land for mining and plantation industries, etc.	1. Social vulnerability indicators (e.g., education, income, indigenous/racial groups); 2. Biodiversity (e.g., species and ecosystem diversity). 3. Landscape connectivity 4. Current status of forest land conservation for mining, plantations, and other industries.
	The interaction of capabilities between technology-infrastructure systems and ecological capacity. The vulnerability of technology-infrastructure systems, the	1. The vulnerability of ecosystems and species to damage caused by forest land use for mining, plantations, etc. (e.g., habitat fragmentation, the presence of threatened or sensitive species).

	vulnerability of ecosystems and species, and mechanisms for detecting and preventing risks and hazards from forest land use for mining and plantation industries, among others.	2. The number, type, and quality of risk and hazard detection and prevention mechanisms.
	Interaction of capabilities between social groups and technological infrastructure systems: Social vulnerability, vulnerability of infrastructure systems, risk detection and prevention mechanisms, dangers from the use of forest land for mining and plantation industries, etc.	1. The level of vulnerability of land use in mining, plantations, etc., to various natural hazards (e.g., structural integrity, indigenous communities, extreme weather). 2. The potential for cascading impacts resulting from failures in industrial land use, such as mining and plantations, etc. 3. The number, type, and quality of risk and hazard detection and prevention mechanisms (e.g., flood, landslide, flood, earthquake protection mechanisms, and early warning systems).

The table outlines the integrated dimensions of ecological and social justice within the Social-Ecology-Technology (SET) framework, offering a structured lens to evaluate how forest governance policies impact both human communities and ecological systems. Each dimension—Distributive Justice, Recognition, Participation, and Capabilities—captures a specific aspect of justice that emerges from interactions among social groups, ecological conditions, and technological infrastructures. Under Distributive Justice, the parameters assess how environmental benefits and burdens are unevenly distributed, particularly in contexts involving mining, plantations, and land-use change.

The Recognition dimension focuses on whether the values, norms, and ecological knowledge of indigenous communities are acknowledged in technological and environmental decision-making. The Participation dimension evaluates the extent to which these communities are actively engaged in governance processes related to forest utilization and land conversion. Lastly, the Capabilities dimension measures social and ecological resilience by examining vulnerabilities, biodiversity status,

and mechanisms for risk prevention and environmental restoration. Together, these indicators enable a holistic assessment of whether forest management practices align with principles of ecological justice, while also identifying systemic disparities that affect indigenous livelihoods, environmental integrity, and long-term sustainability.

The Integrated Ecological Justice and Social-Ecology-Technology System (SETS-Justice) framework represents the interactions between SETS and ecological justice dimensions, as well as their interrelationships. The placement of concentric circles does not represent hierarchical relationships. The ecological justice dimensions and SETS interactions define parameters and indicators. The social-ecology-technology system represents diverse, complex, and interconnected components consisting of humans, indigenous peoples, their beliefs and values, such as the conversion of forest areas for mining, plantations, transportation and energy systems, technology, ecosystems and all their biodiversity, and all systems for managing, planning, and financing these components and their interactions. (Pineda-Pinto et al., 2021)

The dimensions of ecological justice are interconnected, so that obstacles arising from one dimension influence the others (Loos et al., 2023). Ecological justice emphasizes the wise, fair, and equitable distribution of forest use by positioning nature as an active participant (Galloway & Graham, 2023). The meaning of ecological justice in the Indonesian state system is based on the 1945 Constitution, specifically in Article 28H Paragraph (1) and Article 33 Paragraphs (3) and (4). Article 28H Paragraph (1) of the 1945 Constitution emphasizes that everyone has the right to live in physical and spiritual prosperity and to have a place to live with good environmental quality. Article 33, Paragraphs (3) and (4) of the 1945 Constitution outline Indonesia's recognition of environmental rights as part of the basic rights of the Indonesian people.

The principle of protecting forests and indigenous peoples is crucial for achieving ecological justice through good forestry governance (Pane et al., 2021). The co-management model demonstrates the potential for integrating TEK into formal governance structures by fostering participatory decision-making, equitable resource distribution, and culturally grounded conservation practices. These insights underscore the importance of evaluating governance models not only in terms of administrative efficiency but also in their capacity to uphold ecological justice. (Frijat & Elamer, 2025)

4. CONCLUSION

This study demonstrates that Indonesia's current forest-management legal framework inadequately secures distributive fairness, recognition, meaningful participation, and capability-building for indigenous and local communities. By reading the literature through a phenomenological lens and applying the SETS-Justice analytical framework, the research reveals that tensions persist

between formal state law and customary practices, resulting in tenure disputes, uneven distribution of benefits, and the frequent sidelining of Traditional Ecological Knowledge (TEK). Embedded case references (such as the Rempang conflict and Dayak-related forest issues in Kalimantan) illustrate how state-led development and corporate land-use practices often displace or marginalize customary norms and ecological stewardship.

Policy implications are clear: legal reform must move beyond token recognition toward operational mechanisms that integrate TEK into decision-making, land-use planning, and environmental impact assessment. A co-management model that institutionalizes shared authority, transparent grievance mechanisms, and sustained capacity building can better align state policies with local ecological rationalities. Regulatory adjustments should include clearer pathways for recognizing customary forests, mandatory social and ecological impact criteria in permitting, and strengthened channels for community participation and complaint redress. Strengthening legal education and enforcement with cultural competence is also necessary to reduce jurisdictional conflict and improve procedural justice.

Crucially, this study underscores the urgent need to enact the Indigenous Peoples Bill (RUU Masyarakat Adat) into a legally binding Indigenous Peoples Law. The absence of a comprehensive statutory framework leaves indigenous communities vulnerable to dispossession, criminalization, and exclusion from decision-making processes, despite constitutional guarantees of recognition.

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