

RESTRUCTURING LEGAL PRINCIPLES OF BIODIVERSITY CONSERVATION TO RESPOND TO ECOSYSTEM DEGRADATION

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ABSTRACT

This doctrinal legal research examines the role of law in biodiversity conservation by analyzing international conventions, national legislation, and enforcement mechanisms. The study reveals that legal instruments establish normative frameworks and protected areas, yet their influence remains constrained by weak enforcement, regulatory conflicts, limited resources, and corruption. Consequently, biodiversity loss continues despite the proliferation of conservation laws. To address these deficiencies, this research formulates a set of responsive legal principles, including precaution, sustainability, intergenerational equity, proportionality, ecosystem-based approach, public participation, recognition of indigenous rights, fair benefit-sharing, accountability, cross-sectoral integration, and ecological restoration. These principles provide a coherent normative foundation for adapting conservation policies to dynamic ecological conditions and socioeconomic pressures. The proposed framework shifts conservation law from a static, reactive model toward a dynamic, adaptive system that anticipates risks and involves all stakeholders. For policymakers, the findings offer concrete guidance for revising legislation and strengthening institutional capacity. For practitioners, the study provides evaluative criteria for enforcement practices and community engagement. This research contributes to legal scholarship by bridging the gap between normative prescriptions and implementation realities, and by demonstrating that effective conservation law requires not only good rules but also robust governance, political commitment, and active public participation. Without these supporting factors, legal principles remain symbolic declarations with limited transformative power.

Keywords: Biodiversity conservation, environmental law, legal principles, protected areas, species protection, enforcement, indigenous rights.

INTRODUCTION

Biodiversity encompasses all the variations of life on Earth, ranging from genes and species to ecosystems, and serves as the foundation for human survival. Forests provide oxygen and clean water, oceans supply protein, and fertile soil sustains food production.

Thousands of plant and animal species possess medicinal value that has not yet been fully explored. The loss of a single species can disrupt the food chain and reduce the ecosystem's carrying capacity against climate change. The current rate of species extinction is estimated to be hundreds of times faster than the natural background rate, primarily due to land-use change, overexploitation, and pollution (Nasution et al., 2022). Tropical forest areas, which house more than half of the world's species, shrink every year, while coral reefs that support global fisheries experience mass bleaching. These conditions demonstrate that human intervention in nature has reached a scale that threatens biological balance. Conservation efforts have become an imperative, not a choice, because severe ecosystem damage will diminish nature's ability to heal itself (Barlow et al., 2018). In confronting this crisis, the law is positioned as the primary instrument to guide human behavior so that it aligns with nature preservation needs.

Various international treaties have been formulated to protect biodiversity, with the 1992 Convention on Biological Diversity serving as a major milestone. This convention establishes three objectives: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefits arising from genetic resources. Participating states are obligated to develop national strategies and action plans, identify important biodiversity components, and establish protected areas (McConnell, 2019). Furthermore, other conventions such as the Convention on International Trade in Endangered Species regulate trade in endangered species, and the Convention on Wetlands protects waterfowl habitats. This international legal framework forms shared norms that serve as references for national legislation. However, the effectiveness of these conventions heavily depends on the capacity and commitment of each country to translate international obligations into domestic rules. Many developing countries face resource, institutional, and scientific data limitations in fully executing the convention's mandates. Consequently, the gap between commitments on paper and real-world realization remains wide, and biodiversity continues to decline despite the existence of various legal instruments. The balance between economic, social, and environmental aspects is crucial in drafting public policies that are truly sustainable for society (Issalillah & Mardikaningsih, 2022).

At the national level, each country develops its own legal framework for conservation, ranging from forestry, fisheries, and species protection laws to protected area management. Legal approaches often vary between centralization and decentralization, between command-and-control approaches and economic incentives, as well as between rights-based and obligation-based regulations (Essen et al., 2021). In Indonesia, Law No. 5 of 1990 concerning the Conservation of Living Natural Resources and Their Ecosystems serves as the legal foundation for conservation, establishing nature sanctuary areas, nature conservation areas, and hunting parks. The force of legal norms is not limited to sanctions; it also functions as a social control against activities that can harm the environment (Herisasono et al., 2021). However, this law has not been fully integrated

with spatial planning, land, and investment regulations, which frequently conflict with conservation interests. Overlapping authority between central and local governments as well as among ministries causes conservation policies to lose their momentum. Law enforcement in conservation areas is exceptionally weak, with many cases of encroachment and illegal logging left unresolved. Imposed sanctions are often disproportionate to the damage caused, and judicial processes move slowly. This situation indicates that the mere presence of law does not guarantee biodiversity protection, as enforcement aspects and institutional coordination are equally decisive to its effectiveness.

The role of law in conservation is not restricted to prohibitions and sanctions, but encompasses regulating the sustainable use of natural resources, providing incentives for communities that protect the environment, and supplying public participation mechanisms in decision-making. The law can establish co-management schemes involving the government, local communities, and the private sector, as seen in community-based conservation models across various countries (Widjaja, 2024). In these schemes, the rights of indigenous peoples over land and resources are recognized, while the duty to preserve the environment is simultaneously enforced. The law also regulates access to genetic resources and benefit-sharing from their utilization, which serves as a central issue in the implementation of the Nagoya Protocol. On the other hand, the law can create negative incentives through taxes and levies that burden environmentally damaging activities, as well as positive incentives through eco-label certifications and payment for ecosystem services schemes. However, all these mechanisms will only run effectively if supported by competent enforcement officers and an impartial judicial system. Without these, the law loses its coercive power and turns into a declaration without consequences. Therefore, critically examining the role of law requires more than analyzing regulatory texts; it requires exploring how those rules are translated into social and bureaucratic practice.

This study stems from the reality that despite numerous regulations concerning biodiversity conservation, the rate of natural destruction continues to rise, indicating a systemic failure in legal regulation. This failure may originate from legal substance that is irrelevant to field conditions, weaknesses in enforcement institutions, low public awareness, or conflicts of interest between preservation and development. Understanding the root causes of this failure is crucial for legal science to provide evidence-based recommendations. Approaches commonly used in environmental law studies often merely describe regulations without evaluating their implementation, thereby failing to generate knowledge on why the law fails. This study attempts to fill that gap by systematically examining the relationships among legal norms, institutional structures, and stakeholder behavior in the conservation field. As posited by Sands and Peel (2012), international environmental law has grown rapidly, yet its effectiveness remains debated due to a lack of monitoring and compliance mechanisms. Meanwhile,

Bowman et al. (2010) note that international wildlife law faces serious challenges in cross-border enforcement. Both perspectives demonstrate that the role of law in conservation cannot be detached from the political, economic, and social contexts in which the law operates. Thus, this study will normatively examine the conservation legal framework as well as the principles that should underlie it.

The primary issue regarding the role of law in biodiversity conservation is the inability of existing legal instruments to respond to the fast-moving dynamics of environmental destruction. Factors such as widespread deforestation, industrial pollution, and a lack of public awareness regarding environmental preservation serve as the primary triggers for this environmental damage (Masnawati et al., 2023). Conservation regulations are often drafted under the assumption that ecosystem conditions are stable and threats can be clearly identified, whereas climate change, illegal species trade, and land conversion take place at constantly shifting scales and speeds. Rigid and procedural laws are unable to keep pace with destruction, causing preventive measures to arrive too late when damage has become irreversible. Additionally, sectoral approaches that separate forest, marine, and species conservation create overlaps and protection gaps, as ecosystems are fundamentally interconnected. A species protected on land might rely on aquatic habitats that remain unregulated, rendering protection incomplete. At the international level, diverging interests between developed and developing nations hinder the formation of a robust legal regime, as developing nations often demand compensation for their conservation efforts, while developed nations remain reluctant to provide adequate funding.

Another equally critical issue is the weak law enforcement mechanisms in conservation, both nationally and internationally. Violations such as illegal logging, poaching of rare wildlife, and illegal species trade frequently occur with high impunity, as enforcement officers lack the personnel, equipment, and expertise to detect and prosecute violations across vast and remote areas. Corruption within protected area management further worsens conditions, as rogue officers may extend protection to environmental offenders. Mild administrative and criminal sanctions render violations a calculable business risk rather than a serious threat. In the international sphere, no global court or authority possesses the power to compel states to comply with conservation conventions, making compliance voluntary and reliant on diplomatic pressure and reputation. Consequently, many countries submit progress reports that do not reflect realities on the ground, with no tangible consequences for inaccurate reporting. These issues demonstrate that the shortcoming of conservation law lies not in the absence of rules, but in the legal system's inability to enforce those rules effectively.

This study aims to produce a comprehensive legal analysis regarding the gap between conservation legal norms and the reality of biodiversity loss, as well as to formulate normative principles that can strengthen the conservation legal framework. The theoretical contribution of this research lies in developing an adaptive concept of

conservation law responsive to environmental change, while its practical contribution provides policy recommendations for the government and parliament to strengthen conservation regulations and their enforcement mechanisms. Ultimately, this research is expected to bridge the gap between the law and the increasingly urgent needs of conservation.

METHODS

This study is categorized as normative legal research employing a qualitative approach that relies entirely on library research. The normative research method, often referred to as doctrinal legal research, is a fundamental method in legal science that focuses on the analysis of legal concepts, principles, and rules embodied in various written legal sources. As explained by Chynoweth (2008), doctrinal research requires interpretive and qualitative analysis in which no empirical data is collected to create or test theories. Doctrinal research is normative because its validity rests on the development of a consensus within the scholarly community, rather than on proof through the standards of general social science or science. This approach does not involve primary data collection through interviews, observations, surveys, or field experiments, but relies entirely on legal materials available in libraries and electronic databases. Hutchinson and Duncan (2012) emphasize that the doctrinal method lies at the core of legal practice and demands clarity in explaining the methodology to those outside the legal profession. This study uses data sources consisting of three categories of legal materials: primary legal materials, which include laws and regulations related to biodiversity conservation; secondary legal materials, comprising textbooks, journal articles, and scientific writings discussing conservation law; and tertiary legal materials, such as legal dictionaries and encyclopedias. A qualitative approach was selected because it enables a rich interpretation of the meaning of legal norms and their relationship to conservation practices in the field, as affirmed in legal research methodology literature that doctrinal legal research is qualitative because the law is more the product of reasoning than of empirical findings.

The search for legal materials was carried out in a structured manner through national and international databases, institutional repositories, and accredited journals using specific keywords related to biodiversity conservation. The analytical process adapts the literature review typology of Grant and Booth (2009), which encompasses four main stages. First, the literature search focused on keywords such as environmental law, species protection, protected areas, and conservation principles. Second, quality evaluation of sources was applied based on aspects of substantive relevance, author reputation, and publication recency. Third, findings meeting the qualification criteria were synthesized into clusters of legal arguments according to the focus of the problem. Fourth, the final analysis was conducted to formulate a comprehensive legal interpretation regarding the role of normative instruments in conservation.

In line with the views of McConville and Chui (2007), this non-empirical framework bases all its proof on the sharpness of legal text and doctrine analysis. The scientific validity of the study is strictly maintained through testing the logical consistency of arguments as well as the proven qualifications of references. Meanwhile, the reliability of the research is ensured through transparency in the track record of data retrieval and analysis, thereby producing a formulation of conservation law oriented toward normative evidence-based policy.

RESULTS AND DISCUSSION

The Influence of Existing Legal Instruments on Biodiversity Conservation Practices

Existing conservation legal instruments at the international level form a normative framework that influences state behavior in protecting biodiversity through mechanisms of obligations, reporting, and recommendations. The Convention on Biological Diversity, serving as the main umbrella, obligates participating states to formulate national strategies, identify important biodiversity components, and establish protected areas (Priyadarshini et al., 2022). However, the nature of the convention, which provides broad latitude for interpretation, causes implementation to vary significantly among nations. Developed countries with abundant resources are capable of building sophisticated monitoring and enforcement systems, whereas developing countries are often only able to produce planning documents without accompanying concrete action. This capacity gap creates a significant protection disparity, wherein species and ecosystems in developing countries remain vulnerable despite being normatively protected under the same convention. The influence of international instruments is also apparent in the formulation of national regulations, as many countries adopt convention language and principles into their domestic laws. Yet textual adoption does not guarantee effectiveness, as norms not tailored to local conditions frequently lose their applicability. Consequently, the impact of international legal instruments is felt more at the level of discourse and global awareness creation than in actual behavioral changes on the ground.

Other international conventions, such as the Convention on International Trade in Endangered Species, exert a more measurable influence due to their operational and data-driven mechanisms. The licensing and reporting system for trade in endangered species enables cross-border monitoring and violation detection. Member states are required to report trade data and designate administrative and scientific authorities to evaluate the impact of trade on species populations. This mechanism creates clearer accountability compared to framework conventions like the Convention on Biological Diversity, as violations can be identified and addressed during meetings of the parties. Nevertheless, the effectiveness of the Convention on International Trade in Endangered Species remains hindered by differences in enforcement capacity among countries and by illegal trade practices that exploit loopholes in documentation systems. Protected species continue to

be trafficked illicitly through forged documents or via transit countries lacking strict oversight. The influence of this instrument is also limited to species listed in the convention's appendices, whereas many species threatened by habitat loss remain unaddressed. Therefore, although this instrument successfully reduces trade in certain species, its overall impact on biodiversity conservation remains partial and fails to tackle the root causes of extinction.

At the national level, conservation laws establish a legal framework governing protected area management, species protection, and the sustainable utilization of natural resources. These laws establish legal status for conservation areas, providing protection against land-use conversion and exploitative activities (Prip, 2017). The status of nature sanctuaries and nature conservation areas creates zones with varying levels of protection, ranging from total prohibitions against disturbance to limited utilization for research and education. Through the establishment of protected areas, the law constructs a territorial fortress for biodiversity, though the fortress's effectiveness relies heavily on field management and oversight. Many protected areas are legally safeguarded yet physically continue to suffer degradation due to encroachment, illegal logging, and unauthorized mining. The existence of legislation also influences the behavior of communities and business actors by establishing sanctions for violations; however, mild penalties and slow judicial processes undermine the deterrent effect. On the other hand, conservation laws frequently clash with investment and spatial planning statutes that prioritize economic development. Conflicts between these regulations create legal uncertainty and encourage loophole-seeking behavior to evade conservation obligations.

The designation of protected areas through national legal instruments has successfully shielded portions of ecosystems from large-scale conversion, particularly in nations with robust national park management systems. Protected areas serve as final strongholds for threatened species and as natural laboratories for scientific research. Legally protected forests maintain higher tree canopy cover compared to forests outside protected boundaries, demonstrating that legal status offers tangible protection against deforestation. However, protection effectiveness varies considerably depending on area type, location, and management resources. Lowland protected areas adjacent to human settlements and agricultural lands face far greater pressure than mountain regions that remain difficult to access. Furthermore, many protected areas are insufficient in size to maintain species populations requiring large home ranges; thus, despite being legally protected, such species continue to face extinction risks from habitat fragmentation. National laws also establish licensing procedures for activities impacting protected areas, yet these procedures are frequently bypassed through exemption mechanisms or political influence. As a result, protected areas gradually lose their integrity even as their legal status remains officially maintained.

National legal instruments also regulate the protection of certain species through the establishment of protected species lists and prohibitions on hunting, capturing, and

trading. This list of protected species serves as the basis for enforcement officers to take action against violations involving these species. However, the listing process often lags behind scientific developments and changes in population status, resulting in many newly threatened species not receiving immediate legal protection (Cooper, 2021). The process of amending the list takes a long time and requires scientific studies that are often unavailable, so legal protection is only granted when the species population is already severely depleted. In addition, protecting species in isolation without considering the ecological interconnectedness between species renders conservation efforts ineffective. Protecting a predator without protecting its prey or protecting a plant without protecting its pollinator will not restore the ecosystem as a whole. Laws focused on species also face difficulties in dealing with illegal trade involving species not included on the list because they are hard to identify. Consequently, the impact of national legal instruments on species protection is sectoral and incapable of addressing ecological complexities that require an ecosystem-based rather than an individual-species-based approach.

Law enforcement in conservation is the most decisive aspect of how legal instruments influence practices on the ground, yet it is simultaneously the greatest weak point. Law enforcement officers in conservation areas often lack the numbers, equipment, and training to conduct effective patrols across vast and hard-to-reach territories. The ratio of officers to land area is extremely low in many developing countries, so monitoring only covers a small fraction of the territory and at specific times. Offenders exploit this weakness by carrying out illegal activities in rarely patrolled areas or at night. Convolved and corrupt judicial processes further weaken enforcement, as offenders can evade punishment through bribery or procedural loopholes. Imposed sanctions often take the form of small fines or short prison sentences that are disproportionate to the profits derived from environmental destruction. As a result, law enforcement fails to create a deterrent effect, and violations recur continuously. In the international sphere, enforcement faces jurisdictional hurdles because illegal species trade violations cross national borders, while cross-border cooperation in enforcement remains weak. Legal instruments will only exert an influence if their enforcement is credible, and without that credibility, the law loses its coercive power and becomes merely symbolic.

Community participation in conservation through legal mechanisms exerts a significant influence on conservation practices, particularly when local communities possess clear rights over the natural resources surrounding them. Local communities possess traditional knowledge and a broad understanding of their environment, which can contribute significantly to nature conservation efforts (Ramle et al., 2022). Recognition of customary rights and traditional management rights through legal instruments creates incentives for communities to protect forests and wildlife because they derive direct benefits from preservation (Sharkey et al., 2024). Co-management schemes between the government and communities have proven more effective in safeguarding conservation areas compared to centralized approaches that disregard the role of the community.

However, the recognition of community rights is often partial and unstable, as policy shifts can easily revoke rights that have been granted. Communities also face barriers to accessing justice when their rights are violated due to complicated and expensive legal processes. Participation in conservation decision-making is often restricted to the consultation stage without granting real influence over final policies. Consequently, communities feel ignored and lose the motivation to engage in conservation. Legal instruments that ideally empower communities instead turn into tools of domination when not accompanied by substantive participation mechanisms.

The law influences conservation practices through economic incentive mechanisms that encourage pro-environmental behavior. Payment for ecosystem services schemes compensate communities that safeguard forests and ecosystems, establishing a direct link between conservation and economic well-being. Ecolabel certification for timber and fishery products signals to consumers that the products originate from sustainable management, thereby generating market pressure for producers to comply with environmental standards. However, these economic incentives are often insufficient to offset the short-term gains of resource exploitation, especially when commodity prices are high. Payment for ecosystem services schemes also face unsustainable funding issues, as they rely on donor funding or limited state budgets. Furthermore, economic incentives are only effective if backed by law enforcement that prevents free-riding, where non-contributing parties continue to enjoy conservation benefits. Without adequate enforcement, economic incentives can become an additional burden on compliant communities without altering the behavior of violators. Thus, the influence of economic incentives on conservation depends heavily on the overall quality of the underlying legal system.

Various corporate practices are confronted with complex obligations to balance the development interests of the enterprise with compliance demands regarding environmental sustainability principles (Kurniawan et al., 2024). In many legal discussions, it is frequently emphasized that economic development must be accompanied by careful consideration of the social and environmental impacts it generates, so that the benefits of development do not create new risks for society (Santoso et al., 2024). The role of law in conservation also encompasses spatial planning and environmental impact assessment aspects, which influence the location and scale of development activities. Environmental impact analysis is a preventive instrument requiring every development project to examine and manage its impact on biodiversity before permits are granted. This instrument provides protection for sensitive ecosystems by establishing non-disturbance zones and conditions that projects must satisfy (Craik & Craik, 2017). However, the effectiveness of environmental impact analysis is often compromised by low document quality, limited third-party involvement, and weak post-permit oversight. Many environmental impact analysis documents are prepared merely to satisfy formal requirements without reflecting actual risks, and frequently utilize

outdated or inaccurate data. When the gap between documentation and practice becomes a habit, recurring environmental violations emerge (Rahmawati et al., 2023). Business actors also have incentives to understate environmental impacts in their documentation to reduce mitigation costs. Once permits are obtained, oversight regarding compliance with environmental impact analysis stipulations is extremely weak, and violations are rarely prosecuted. Consequently, this instrument often fails to prevent biodiversity destruction that should have been avoided.

Conservation law in Indonesia, as embodied in Law No. 5 of 1990, exerts a significant influence on the establishment of conservation areas and the designation of protected species, yet its implementation faces various structural hurdles. This law establishes categories of nature sanctuary areas consisting of strict nature reserves and wildlife sanctuaries, as well as nature conservation areas consisting of national parks, grand forest parks, and natural recreation parks. Each category has a different level of protection, with strict nature reserves serving as the most stringent zone where human activities are severely restricted. However, this law does not explicitly regulate effective enforcement mechanisms and frequently conflicts with regulations in the forestry and mining sectors. Conflicts between regulations are exploited by business actors to open mines and plantations inside conservation areas using permits from other sectors. Additionally, the process of changing the legal status of an area, which should undergo strict procedures, is often conducted unilaterally by local governments without adequate studies. In practice, conservation areas in Indonesia lose acreage every year due to land conversion and degradation, demonstrating that the influence of national law is not strong enough to stem development pressures.

International legal instruments also influence conservation practices in Indonesia through funding mechanisms and technical assistance channeled via bilateral and multilateral cooperation (Riyadi & Setiono, 2023). Funds from the Global Environment Facility and other donor programs are used to build capacity for national park managers, conduct species inventories, and develop monitoring systems. This technical assistance helps improve management quality in several areas, but its sustainability relies on the continuation of foreign funding. When funding ends, many activities cannot be sustained because local governments lack their own budgets for conservation. International funding also frequently focuses on areas attractive to donors, while other equally vital areas are neglected. As a result, biodiversity protection in Indonesia becomes uneven and heavily reliant on the interests of external donors. Nevertheless, the presence of donors and international institutions exerts pressure on the government to enhance transparency and accountability in conservation management. This influence is indirect but nonetheless contributes to the gradual improvement of conservation practices.

The influence of legal instruments on biodiversity conservation practices is largely determined by factors outside the legal text itself. International legal instruments construct normative frameworks and global awareness, but their effectiveness depends

on national capacity and the political commitment of participating states. National legal instruments create a legal foundation for area and species protection, yet their implementation is hindered by weak enforcement, regulatory conflicts, and minimal resources. Participatory instruments and economic incentives can strengthen conservation, but their results depend heavily on the overall quality of the legal system and governance. Law enforcement in conservation is indeed largely in the hands of the government; however, alongside various developments, the burden of enforcing that role can no longer be left to the government alone. The role of various public authorities in monitoring and enforcing the law itself is crucial (Nuraini et al., 2021). Thus, the role of law in conservation cannot be understood as a deterministic relationship between rules and outcomes, but rather as a complex interaction among norms, institutions, and stakeholder behavior. Successful conservation through law requires not only good rules, but also strong institutions, competent officers, empowered communities, and consistent political support. Without these, conservation law will remain a declaration without force, and biodiversity will continue to decline despite the endless proliferation of regulations.

Legal Principles for Responsive Conservation Governance of Biodiversity Amid Ecosystem Damage

A legal framework for biodiversity conservation that is responsive requires a foundation of normative principles capable of accommodating ecosystem changes and ever-increasing anthropogenic pressures. The first foundational principle is the precautionary principle, which obligates decision-makers to act preventively even in the presence of scientific uncertainty regarding environmental damage risks. This principle arises from the recognition that awaiting definitive scientific proof before taking protective action often means measures arrive too late, when damage has become irreversible (McDonald et al., 2019). In a conservation context, the precautionary principle demands that development activities potentially threatening biodiversity be restricted or prevented until proven safe, rather than allowing activities until proven harmful. Implementing this principle in national law can be realized through mandatory, stringent environmental impact assessments and licensing processes that require applicants to demonstrate the absence of significant risks to species and ecosystems. The burden of proof under this principle rests on the party proposing the activity, not on the government or affected communities. Consequently, the precautionary principle shifts the dynamics of conservation decision-making from reactive to proactive, providing space for preventive action before damage occurs.

The sustainability principle serves as the second inseparable pillar of conservation regulation. Policies grounded in the sustainability principle must consider the balance between current needs and the ability of future generations to meet their own needs (Mardikaningsih & Hariani, 2021). Conservation is inherently an effort to ensure that natural resource utilization does not exceed nature's regenerative capacity. This principle

requires that the rate of species and ecosystem utilization remain within limits that allow for long-term regeneration and maintenance of ecological functions. In legal practice, the sustainability principle translates into fishing quotas, forest harvest limits, and seasonal prohibitions on specific resource extraction. However, applying this principle frequently encounters difficulties because scientific data on ecosystem recovery capacity is not always available or accurate. Failing to set conservative utilization limits results in overfishing and deforestation that exceed nature's ability to recover. Therefore, the law needs to integrate adaptive mechanisms that allow utilization limits to be adjusted based on the latest data from ecosystem monitoring. This adaptive approach ensures that the sustainability principle does not become an empty slogan, but rather an operational guideline continuously updated in accordance with the actual state of biodiversity.

The principle of intergenerational equity provides a temporal dimension to conservation law by recognizing that future generations possess an equal right to biodiversity as the present generation. This right implies that conservation actions must not compromise the ability of future generations to satisfy their own needs from natural resources. This principle challenges short-term development logic that frequently dominates economic policy, as current gains may be paid for with massive future losses (Cavender-Bares et al., 2024). Within a legal framework, the intergenerational equity principle can be realized through bans on non-renewable resource exploitation beyond specific thresholds, and through mandates to set aside funds for damaged ecosystem restoration. This principle also demands representation of future generations' interests in decision-making processes, such as through oversight bodies holding long-term mandates. Although difficult to measure quantitatively, the principle of intergenerational equity provides a moral foundation for the law to limit the current generation's freedom in managing natural resources. Precautionary and proportionality principles within international frameworks assist states in balancing competing interests, including intergenerational needs. By internalizing this principle, conservation law no longer solely regulates relationships among contemporaries, but also the relationship between present and future humans.

The principle of proportionality becomes crucial in managing conflicts between conservation interests and economic development priorities, as not all restrictions on resource utilization can be morally and legally justified. This principle requires that any restriction imposed for conservation purposes must be proportional to the benefits gained from such protection, and must not be more burdensome than necessary to achieve conservation goals. In practice, proportionality means that total bans on an activity can only be justified if the activity poses a serious threat to biodiversity that cannot be mitigated by milder means. If threats can be managed through partial restrictions or specific technical requirements, a total ban is deemed disproportionate. Applying this principle demands a case-by-case assessment that considers threat severity, available alternatives, and the socio-economic impacts of restrictions. In national law,

proportionality can be embodied through tiered licensing processes, where low-impact activities receive more lenient requirements compared to high-impact activities. States need to codify the proportionality principle into national law to provide clear guidance for environmental impact assessments and project approval processes. Thus, proportionality prevents over-protection that could harm communities without yielding commensurate conservation benefits.

The ecosystem principle shifts the focus of protection from individual species or specific areas toward entire interconnected ecological systems. An ecosystem-based approach recognizes that species cannot be effectively protected without protecting their habitats, and habitats cannot be sustained without maintaining the ecological processes that support them. This principle requires conservation law to regulate not only endangered species, but also species interactions, nutrient cycles, energy flows, and population dynamics. In practice, the ecosystem approach means protected areas must be designed with ecological connectivity in mind, enabling wildlife to migrate between habitats for feeding, breeding, and evading environmental pressures (Dyke & Lamb, 2020). The law also needs to regulate activities outside protected areas that can affect internal ecosystems, such as controlling pollution originating upstream or from buffer zones. The ecosystem approach challenges sectoral regulations that separate forest, marine, and species conservation, as ecosystems do not recognize administrative boundaries. Therefore, a responsive conservation legal framework must integrate various sectors and governance levels into a coherent, coordinated approach.

The principle of public participation provides space for the public, including indigenous peoples and local communities, to engage in conservation decision-making that affects their lives. Participation is not merely symbolic consultation, but substantive involvement in policy formulation, planning, implementation, and evaluation of conservation programs. This principle is grounded in the recognition that communities living around conservation areas possess valuable local knowledge about ecosystems and species, and hold a direct stake in natural resource preservation. Community engagement also enhances the legitimacy of conservation policies and reduces conflicts between management authorities and local residents. In law, the participation principle is realized through the public's right to access information on conservation policies, the right to be heard before decisions are made, and the right to lodge objections against adverse decisions. However, effective participation requires community capacity to understand technical and legal issues, as well as access to fair judicial processes when their rights are violated. Therefore, responsive conservation law must be accompanied by community empowerment programs and legal assistance that enable meaningful participation.

The principle of recognizing indigenous rights is increasingly vital within conservation frameworks because many biodiversity-rich areas lie within territories traditionally managed by indigenous peoples. Research indicates that indigenous-managed lands often exhibit lower deforestation rates than government-managed protected areas, owing to

indigenous peoples' deep spiritual and economic ties with nature. This principle demands that the law recognize customary rights and traditional management rights over land and natural resources, while respecting traditional knowledge in conservation management (Sapignoli & Hitchcock, 2023). Recognizing these rights does not mean granting unrestricted freedom to indigenous communities, but rather establishing shared responsibility for preserving biodiversity in ways aligned with local cultural values. In practice, this principle can be realized through co-management agreements between governments and indigenous peoples, where both parties share authority and responsibility. The law also needs to protect indigenous peoples from evictions that frequently occur in the name of conservation, as evictions not only violate human rights but also destroy knowledge systems proven effective in preserving nature.

The principle of fair benefit-sharing dictates that advantages derived from the utilization of genetic resources and biodiversity must be shared equitably between resource providers and users. This principle lies at the heart of the Nagoya Protocol, which governs access and benefit-sharing, aiming to prevent the exploitation of developing nations' genetic resources by companies from developed nations without fair compensation. Within national legal frameworks, this principle is realized through regulations on access to genetic resources, prior informed consent requirements, and legally binding benefit-sharing agreements. Benefit-sharing can be financial, such as royalties, or non-financial, such as technology transfer and capacity building. However, implementing this principle often faces obstacles due to developing nations' lack of capacity to negotiate fair deals and monitor user compliance. Responsive conservation law needs to strengthen the bargaining position of provider countries by establishing competent national authorities and fostering regional cooperation in sharing information and experiences. Thus, the principle of distributive justice not only protects biodiversity but also provides economic incentives for conservation.

The principle of accountability demands mechanisms ensuring that all parties involved in conservation—including governments, business actors, and the public—are held responsible for their actions and decisions affecting biodiversity. Accountability reflects actions undertaken by an organization as well as the impacts generated by its activities on ecological systems (Darmawan, 2022). Accountability encompasses the obligation to report conservation performance transparently, adhere to established standards and procedures, and accept sanctions in cases of non-compliance (Smith et al., 2020). In law, this principle is realized through periodic reporting systems, performance audits, and grievance mechanisms enabling the public to report violations. Accountability also includes legal liability for public officials who neglect conservation duties or issue unauthorized permits. Without accountability, conservation law loses its coercive power and violations persist without consequence. Best practices in conservation law demonstrate that accountability must encompass not only negative sanctions but also rewards for good performance, thereby creating incentives for voluntary compliance.

Independent oversight bodies are necessary to ensure accountability is not merely procedural but substantive, equipped with authority to investigate violations and recommend corrective actions.

The integration principle demands that conservation considerations be incorporated into all development policies and decisions, rather than confined strictly to environmental policy. This principle acknowledges that the primary drivers of biodiversity loss lie outside the conservation sector, such as in agriculture, mining, fisheries, and infrastructure. Biodiversity protection cannot be achieved through conservation legislation alone; it requires shifts in how all sectors plan and execute their activities (Otero et al., 2020). In practice, the integration principle is realized through mandatory environmental assessments for all development projects, spatial planning regulations incorporating conservation values, and incentives for sustainable production practices. This principle also demands inter-ministerial and inter-governmental coordination, as policies in one sector frequently impact biodiversity in another. Without integration, conservation policy will continuously lose out to development policies possessing greater resources and political influence. Responsive conservation law must possess mechanisms to ensure biodiversity considerations become an integral part of every development decision, rather than an ignorable afterthought.

The restoration principle recognizes that conservation cannot stop at protecting what remains; it must also rehabilitate degraded ecosystems. This principle stems from the recognition that many ecosystems have suffered degradation so severe that they cannot recover naturally without human intervention. Ecosystem restoration includes reforestation of cleared lands, rehabilitating damaged coral reefs, restoring drained wetlands, and reintroducing locally extinct species. In law, the restoration principle is realized through obligations forcing environmental polluters to repair the damage they cause, in accordance with the polluter-pays principle. Restoration can also serve as the objective of publicly funded conservation programs, featuring measurable targets and clear timelines. However, ecosystem restoration is a lengthy and costly process, and its success is never guaranteed due to the difficulty of re-engineering complex ecosystems. Therefore, the restoration principle must always be balanced with the prevention principle, as preventing damage is far more effective and less costly than repairing it. Responsive conservation law should prioritize restoration efforts on ecosystems that are most critical and most likely to be successfully restored.

A legal framework for conservation that is responsive to ecosystem damage requires a combination of complementary and mutually reinforcing normative principles. Precautionary, sustainability, intergenerational equity, proportionality, ecosystem, public participation, recognition of indigenous rights, fair benefit-sharing, accountability, integration, and restoration principles form a coherent value system for conservation governance. These principles do not stand in isolation; rather, they are interconnected and frequently require balancing during application. For example, the proportionality

principle balances the precautionary principle against development interests, while the public participation principle reinforces accountability and fairness. A legal framework consistently adopting these principles will be better equipped to respond to the evolving dynamics of ecosystem damage, as these principles provide flexibility for policy adjustments without sacrificing core conservation values. As emphasized in reports on legal and policy pathways for effectively managed conservation areas outside protected areas, nations are adapting Convention on Biological Diversity guidelines into domestic laws and strengthening governance arrangements alongside transparent documentation procedures. However, adopting these principles alone is insufficient, as implementation requires political commitment, institutional capacity, and active public participation. Without these supporting factors, principles of conservation law will remain normative declarations lacking genuine transformative power on the ground.

CONCLUSION

International and national biodiversity conservation legal instruments form a normative framework that influences the behavior of states and society, yet this influence is severely constrained by weak enforcement, regulatory conflicts, and resource limitations. International conventions such as the Convention on Biological Diversity and the Convention on International Trade in Endangered Species create obligations and reporting mechanisms, but implementation varies significantly among countries due to differences in capacity and political commitment. At the national level, conservation laws establish protected areas and lists of protected species, yet degradation continues to occur as a result of encroachment, illegal logging, and weak oversight. Law enforcement constitutes the single greatest weakness, as personnel lack adequate staffing and equipment, sanctions remain mild, and judicial proceedings are slow. To address these shortcomings, the conservation legal framework requires a foundation of responsive normative principles, encompassing precaution, sustainability, intergenerational equity, proportionality, the ecosystem approach, public participation, recognition of indigenous rights, fair benefit-sharing, accountability, cross-sectoral integration, and ecosystem restoration. These principles complement one another and provide flexibility for policy adjustments without compromising core conservation values. Without political commitment, institutional capacity, and active public participation, these principles will not produce tangible change. Consequently, the role of law in conservation is not deterministic; rather, it depends heavily on the overall quality of the governance system and support from all stakeholders.

Conservation area management agencies must enhance patrolling and monitoring capacity by leveraging satellite-based monitoring technologies and geographic information systems, while strengthening cooperation with surrounding communities through co-management schemes that recognize traditional rights. Law enforcement officers require specialized training in environmental crimes alongside the establishment

of dedicated units within law enforcement and prosecutorial authorities to handle conservation cases professionally and independently. The judicial system needs to streamline procedures for handling environmental cases so that proceedings do not drag on, allowing sanctions to be imposed swiftly and to deliver a deterrent effect. Local governments are obligated to align spatial planning with conservation area maps and reject activity permits that threaten biodiversity within and around protected areas. Civil society is encouraged to utilize available participation and environmental litigation mechanisms to safeguard conservation policy, while academics continuously conduct research on the effectiveness of conservation law and disseminate their findings to the public. Through these measures, conservation law is expected no longer to remain merely a normative document, but to function as an instrument that genuinely protects natural wealth for present and future generations.

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