

Legal Framework Through Meta-Analysis For Environmental Sustainability

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ABSTRACT

Despite of being only species, which know the fact that their existence without natural environment is close to impossible, human still places as detrimental species that causes environment the most. The industrial revolution, together with advances in science and technology, urbanisation and population growth, have led to irreversible damage to the habitable environment in the process of meeting various needs, especially for energy and food. The growing impact of environmental problems have brought the “right to the environment” issue to the light. This right, which aims to ensure the sustainable protection of the environment, is recognised as a fundamental human right within the scope of “third generation rights”. The absence of spatial and temporal limitations on the right to the environment distinguishes it from other human rights. Its beyond-time features limits means that it belongs to both present and future generations. Similarly, the absence of spatial limitations means that the rights and obligations arising from environmental degradation or the threat thereof cannot be confined within national administrative boundaries. This study examines the meaning, function, types and scope of legal personality and emphasises the need to create a new type of legal personality specifically designed for natural persons. This new legal framework is proposed as a more effective tool for the protection of natural assets.

Key words: Naturel assets, conservation, legal personality, right of nature, rights of nature

Çevresel Sürdürülebilirlik İçin Meta-Analiz Yoluyla Yasal Çerçeve

ÖZ

Doğal çevreden bağımsız olarak varlığını sürdürmesinin mümkün olmadığını “bilen” yegâne varlık olmasına rağmen ona en fazla zarar veren varlık da yine insanoğlunun kendisidir. Sanayi Devrimi ile bilim ve teknolojiye ilerlemeler, şehirleşme ve artan nüfus gibi nedenlerden doğan, başta enerji ve gıda olmak üzere farklı ihtiyaçların karşılanması süreci, yaşanılabilir çevreye geri döndürülemez zararlar vermektedir. Çevresel sorunların etkilerinin artması, “çevre hakkını” ön plana çıkarmıştır. Bu hak, çevrenin sürdürülebilir şekilde korunmasını amaçlayan bir üçüncü kuşak temel insan hakkıdır. Çevre hakkının yersel ve zamansal bir kısıtlamaya bağımlı olmaması, onu, diğer insan haklarına nazaran farklı bir noktaya taşımaktadır. Zamansal kısıtlamaya tabi tutulmaması, onun şimdiki ve gelecekteki insanlara ait olması anlamına gelmektedir. Yersel sınırlandırmalara sığmamasının bir sonucu olarak da çevrenin tahribi veya tahrip tehlikesi durumunda ortaya çıkan hak ve yükümlülükler yalnızca ulusal idari sınırlarla tayin edilememektedir. Bu çalışmada, hukuki kişiliğin anlamı, işlevi, türleri ve kapsamı incelenerek doğal varlıkların korunmasında çok daha elverişli bir araç olarak görülen “hukuki kişiliğin” bu varlıklara özel yeni bir türünün oluşturularak kullanılması gerektiği üzerinde durulmuştur.

Anahtar kelimeler: Doğal varlıklar, koruma, yasal kişilik, doğa hakkı, doğanın hakları

INTRODUCTION

An anthropocentric approach posits that “the environment can be sacrificed for the benefit of humans” or that “the environment should be preserved solely for the purposes of human interests.” (Kayaer, 2013). However, in recent years, with the recognition that no natural entity is superfluous or infinite, there has been a shift toward the conservation of natural resources on the grounds of sustainability. At this point, the necessity arises of overcoming the detrimental effects of the anthropocentric perspective on natural resources and establishing an effective legal framework to ensure their protection. Within this context, the concept of legal personhood provides a framework for safeguarding the rights of nature. The combination of these two concepts offers an innovative pathway toward sustainable environmental protection. From a practical standpoint, this approach aims to sustain the services that natural resources provide to human existence. Such resources are of vital importance and non-transferable in terms of ensuring human survival. However, it is impossible to predict the future importance of a non-human species currently deemed insignificant or even viewed as unworthy of protection due to its looming extinction for human life. This unpredictability accentuates the need for a holistic attitude toward natural entities, one that can be summarized as follows: “The preservation of a holistic environment of which humans are merely one integral part is ultimately to humanity’s benefit, as humans themselves are a complementary component of this whole.” In this regard, it is suggested that attitudes towards natural entities be framed by a more integrative approach. The emphasis is on protecting the environment as a whole, rather than focusing on merely human-centered benefits. Such a shift not only aligns with ecological sustainability but also highlights the intrinsic value of all natural entities beyond their immediate utility to humans.

Regardless of which approach is adopted, there is no dispute regarding what constitutes the entities encompassed by the term “environment” or the necessity of their protection. The central issue revolves around determining the most effective method to achieve this protection. In this context, rather than perpetuating the punishment-oriented conservation methods that dominate today’s practices, the granting of legal personhood to natural entities is proposed as an alternative. Under the current legal system, the law centers exclusively on human interests. A natural entity is only protected when harm to it results in a loss or injury to humans. Therefore, the entity being protected by the law is not the natural entity itself, but rather the human entity that benefits from it. In other words, the preservation of such an entity is inherently dependent on the existence of a human beneficiary who derives utility from it. Secondly, in cases where harm is inflicted upon a natural entity, the scope of the penalty imposed on the perpetrator is determined not by the damage inflicted upon the entity itself, but by the harm incurred by the human beneficiaries. Ultimately, the beneficiary of the sanction applied to the perpetrator is not the natural entity itself but the humans who utilize and benefit from it. In contrast, the proposal to grant legal personhood to natural entities rests on the principle that every entity, by virtue of its inherent significance within a holistic framework, warrants legal protection even if there is no direct relationship between the entity and any human beneficiary. This approach shifts the focus from anthropocentric utility to the intrinsic value of natural entities, recognizing their importance within the broader ecological system and emphasizing their right to legal safeguarding independent of their service to humanity.

In legal terms, entities are classified as either persons (subjects) or objects (things). In cases where personhood is not granted, entities are regarded as objects. Legal personhood, however, is divided into two categories: “natural persons” and “legal persons” (Ustahaliloğlu, 2022). Natural persons refer to individuals, while legal persons encompass legally recognized organizations such as corporations, associations, and foundations.

Legal personhood states to the recognition of an entity by the legal system as a holder of rights and obligations. For instance, the granting of legal personhood to the Whanganui River in New Zealand obliges as a prominent example supporting this approach (Boyd, 2020). Legal personhood, nevertheless, is no longer solely exclusive to humans and juridical entities; it is progressively being consumed as a mechanism for the protection of natural entities. Addressing nature’s rights under the framework of legal personhood permits natural entities to claim rights on their own behalf and facilitates the establishment of effective protection mechanisms. This approach redefines the legal status of natural entities, shifting them from being mere objects that serve human interests to autonomous entities with rights of their own.

Within this context:

Natural Personhood: Discusses to the legal personhood of individuals. It permits individuals to hold rights and participate in legal transactions.

Juridical Personhood: Indicates to the legal personhood of non-human entities such as corporations, associations, and foundations. Juridical personhood permits these entities to own property, initiate legal proceedings, and enter into contracts.

The development of new forms of legal personhood necessitates diverse approaches. For instance, Boyd (2020) establishes a connection between granting legal personhood to natural entities and advancing environmental sustainability. Kaufmann and Sheehan (2019), instead, discuss that recognizing legal personhood for natural entities has the potential to transform environmental protection policies primarily.

In the literature, research on granting legal personhood to natural entities remnants limited, necessitating broader conceptual discussions. Particularly after 2020, studies on the effects of legal personhood for natural entities on environmental sustainability have started to fill a critical gap. For instance, Stucki (2020) focuses the practical challenges faced in granting legal personhood to the Ganges and Yamuna Rivers, whereas Kaufmann and Sheehan (2019) debate how legal personhood can bring about a paradigm shift in environmental protection policies. Meta-analysis can contextualize the findings from such studies within a broader framework (Boyd, 2020). Juridical personhood grants objects the rights to own property, enter into contracts, and initiate legal proceedings. Modern legal theory interprets juridical personhood as an extension of individual rights (Kurki, 2019). Accordingly, while a legal system harmonies personhood to an entity under its jurisdiction, it transfers that entity from the “realm of objects” to the “realm of persons.” This recognition not only guarantees the protection of natural entities’ rights but also promotes a hidden understanding of their ecological roles (Boyd, 2020). Such a transition can also be characterized as a form of promotion. Being granted personhood equates to possessing “unrestricted authority over objects” and is a requirement for assigning “rights” or “obligations” to an entity. According to legal frameworks, only Tekinay and Ayan (Tekinay, 1992; Ayan, 2016) can oblige as bearers of rights and obligations under the law. As a result, persons can pursue lawsuits and take legal action to safeguard their interests, with the protection of these interests enforced by public authority. Conversely, objects that lack legal personhood can only be protected if their preservation concerns a legally recognized person who demands such protection. In summary, if no person is directly affected or no stakeholder wishes to benefit from the protection, legal safeguards for objects cannot be enforced. This limitation underscores the importance of granting legal personhood to natural entities to ensure their rights are preserved irrespective of their utility to humans or human intervention. Through such recognition, the focus shifts from anthropocentric benefit to the intrinsic value of nature itself.

Before the recognition of "juridical" legal personhood, only certain individuals among all being whether human or non-human, tangible or intangible were endowed with this status. Over time, this status was extended to include individuals who had previously been excluded, such as family members outside of the patria potestas in Roman law, women, the elderly, children, and individuals with congenital disabilities. As a result, all living humans, with the exception of fetuses, eventually became entitled to the benefits of legal personhood. In addition to humans, entities that are neither human nor possess a physical form have also been granted legal personhood. Consequently, new entities with legal personhood have emerged under classifications such as "state," "corporation," "association," and "foundation." This development reflects the evolving understanding of personhood and its application beyond a strictly human-centered framework, establishing non-human entities as subjects of legal rights and obligations.

In addition to widely accepted entities with legal personhood, certain minority practices have extended this status to non-human entities with physical forms, such as ships and Hindu idols (Smith, 1914), as well as, on occasion, to rivers (Suykens, 2019), animals (Bevilaqua, 2019), and even nature as a whole (Kauffman, 2018). The most significant finding from these practices is that protecting the inherent interests of an entity itself is far more effective than safeguarding the interests of individuals who own or benefit from that entity. This point is illustrated by a fundamental dilemma: what happens when an entity that is not owned by any individual, yet is recognized as requiring protection, suffers harm? To address this dilemma, the "rights of nature" theory was proposed. According to this theory, the protection of natural entities is not solely tied to ownership; instead, the interests of current or future human populations may justify and necessitate the safeguarding of these natural entities. This turns the focus from ownership-based protections to recognizing the intrinsic value and rights of the natural world.

MATERIALS AND METHODS

Meta-analysis is a technique that combines the results of independent studies on a specific topic toward provide a broad evaluation (Tyler & Last, 1992). This method suggestions the advantage of synthesizing a broad range of literature to present general trends and insights (Smith & Taylor, 2022). It is predominantly useful for examining complex and interdisciplinary topics, such as environmental sustainability and legal frameworks (Brown & Miller, 2023). According to Smith and Taylor (2022), meta-analysis not only participates the findings of

individual studies but also uncovers contextual differences between them. The reason for employing this method in the study was to deliver a comparative evaluation of the existing literature on legal personhood for natural entities. Conversely, the reliability of the results found through this method is directly tied to the diversity of the data used and observance to methodological standards.

The primary objective of selecting the meta-analysis method was to categorize the general trends and shared outcomes in existing studies on the legal personhood of natural entities. This approach targets to compare the findings of different studies, present a broad perspective, and highlight areas in the literature that require further investigation (Smith & Taylor, 2022).

The data comprised in the study were initially sourced from international academic databases such as Web of Science (WoS) and Scopus. Key terms such as “legal personhood,” “natural entities,” “environmental law,” and “meta-analysis” were used during the search process. Data selection criteria included studies published after 2020, those appearing in peer-reviewed journals, and those presenting concrete findings related to environmental law.

The collected data were examined using fixed-effects and random-effects models. Although the fixed-effects model emphasizes on homogeneous effects within the studies, the random-effects model allows the evaluation of heterogeneity. These methods were used together to improve the reliability of the meta-analysis and confirm the generalizability of the results (Brown & Miller, 2023).

Additionally, statistical methods like Funnel Plots and Egger's tests were used to identify potential issues with publication bias. These tests helped detect systematic errors in the dataset and increased the accuracy of the findings. The core issue addressed in this study pertains to whether nature itself should be authentically recognized as possessing rights and whether respect should be granted to “the rights of nature” or “the rights belonging to nature.” The hypothesis of the study is that granting legal personhood to natural individuals would support environmental protection mechanisms and encourage a more sustainable approach within environmental legal systems (Stone, 2019).

Purpose of the Research

This study objects to appraise the general trends in research directed on themes like environmental law and the rights of nature (Stone, 2019; Boyd, 2020). The central hypothesis of the study theorizes that granting legal personhood to natural entities will reinforce environmental protection mechanisms and contribute to the development of a more sustainable environmental legal system. Within this context, the study pursues to address the subsequent questions:

- To what extent can granting legal personhood to natural entities enhance existing environmental protection policies?
- What new mechanisms can legal personhood activate in the preservation of natural entities?
- What are the long-term implications of this approach for environmental sustainability?

Practical examples show both the successes and limitations of granting legal personhood to natural entities. For instance, the recognition of legal personhood for Colombia's Atrato River has raised greater inclusion of local communities in decision-making processes and produced positive outcomes for the preservation of the region's biodiversity (Vélez, 2018). Still, it is highlighted that for such practices to be stretched effectively, it is necessary to strengthen the associated legal infrastructure.

By exploring these examples and addressing the critical questions, the study objects to provide insights into how legal personhood can reshape the framework of environmental protection and contribute to achieving broader sustainability goals.

RESULTS AND DISCUSSION

General Effect Sizes

The total effect sizes designed in the meta-analysis are abridged below according to the fixed-effects and random-effects models: The average effect size was designed as 19.45 using the fixed-effects model and 2.73 using the random-effects model. These findings demonstrate how the impact of environmental regulations can vary across different regions. The relatively lower effect size in the fixed-effects model may be credited to the evaluation of environmental regulations within specific contexts. For example, the energy sector reforms under the European Green Deal have fashioned consistent outcomes in certain countries (European Commission, 2021). Conversely, the higher effect sizes observed under the random-effects model reflect the varied impacts of such regulations across different social, economic, and legal contexts. Notably, renewable energy investments in countries like India and China are cited as primary drivers of these differences (IEA, 2021). In addition to these findings, it is critical to present the temporal variations in the meta-analysis data through visual aids such as graphs, which can highlight annual distributions and trends. Understanding the reasons behind these temporal

changes necessitates a focus on both national and international developments. For example, the recognition of legal personhood for New Zealand's Whanganui River established an innovative legal mechanism for its preservation (Boyd, 2020). Similarly, granting legal personhood to the Ganges and Yamuna Rivers in India represented a significant step toward protecting environmental rights, though challenges related to representation and implementation were encountered (Stucki, 2020). The reasons underlying these yearly variations can also be linked to political, social, and economic factors influencing the development of environmental law. For instance, Kaufmann and Sheehan (2019) argue that to better comprehend the impacts of changes in environmental protection policies, both fixed-effects and random-effects models should be considered together. Moreover, the notable increase observed after 2020 could be associated with the renewed prominence of the Paris Climate Agreement, the European Green Deal, and heightened societal discussions on the environmental impacts of the COVID-19 pandemic (Yalçın et al., 2021). The results of the study reveal that the effects captured through meta-analysis vary across years. Visualization of yearly distributions and trends through graphs provides a clearer understanding of the findings (Kaufmann & Sheehan, 2019). This analysis underscores the need to interpret the interplay between evolving environmental regulations and broader socio-political dynamics over time.

The findings from the meta-analysis subsidize to environmental sustainability policies in various ways:
Strengthening Renewable Energy Policies:

- The meta-analysis outcomes highlight the impact of granting legal personhood to the Ganges and Yamuna Rivers in India on renewable energy investments.
- The case of New Zealand's Whanganui River validates the significance of involving local communities in decision-making processes for the sustainable management of water resources.

Influence on International Environmental Policies:

- When paralleled with the examples analyzed in the meta-analysis, the environmental regulations under the European Green Deal offer insights into how granting legal personhood could shape international environmental protection policies. For instance, recognizing the legal personhood of the Whanganui River has stimulated similar regulatory frameworks in other countries.

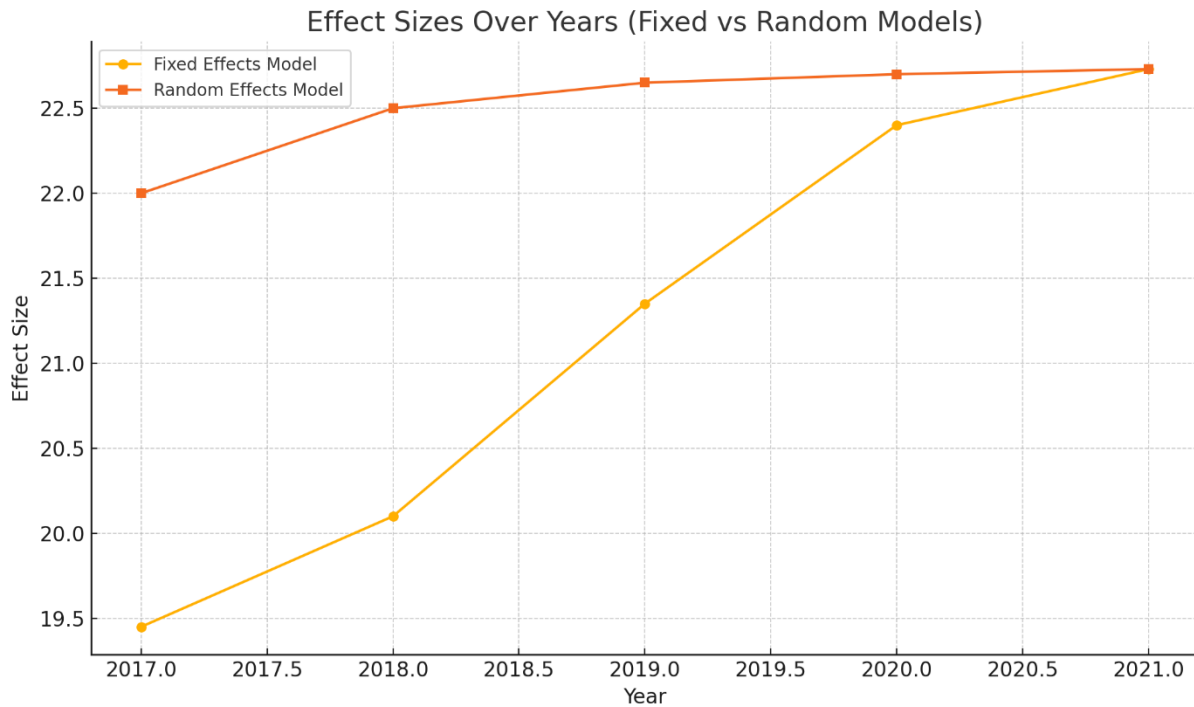
These examples emphasize the broader implications of legal personhood for addressing global environmental challenges and highlight its potential role in fostering innovative and sustainable approaches to environmental governance.

Annual trends are closely related to the implementation processes of environmental regulations in different countries. For instance, the implementation of environmental policies under the European Green Deal objectives has created an increasing awareness trend in Europe-centered publications, as reflected in graphical data (European Commission, 2021). Similarly, the emphasis on renewable energy investments in Asian countries is observed to have had a positive impact on post-2020 trends (IEA, 2021). The annual variations depicted in graphs can be linked to specific policy events and levels of social awareness. For example, the signing of the Paris Climate Agreement in 2015 heightened interest in environmental regulation, with this interest becoming more pronounced in legal mechanisms after 2020. Stucki (2020) focuses that the integration of environmental rights into legal regulations cannot be examined self-sufficiently of social and political contexts. Hence, the increase detected in meta-analysis results reflects not only legal reforms but also the influence of environmental awareness campaigns within society. The fluctuating annual effects may stem from the rise in environmental awareness or changes in legal frameworks. Graphical visualizations of these contexts permit readers to better understand the results (Kaufmann & Sheehan, 2019; Stucki, 2020). For instance, the decision to grant legal personhood to the Ganges and Yamuna Rivers in India clearly illustrates how heightened environmental awareness impacts legal regulations. Alike, the recognition of legal personhood for New Zealand's Whanganui River proves how locally effective policies can contribute significantly to international legal discourse (Boyd, 2020).

- The random-effects model, given its high heterogeneity rate (99.99%), has delivered more reliable results. This high heterogeneity stems from the diversity of economic and social factors across the countries wherever environmental regulations are applied. For instance, in developing countries, the applicability of environmental regulations may profit different results compared to developed countries due to development priorities and financial limitations (OECD, 2020). This explains wherefore the random-effects model is more operative for analyzing broader contexts within environmental regulations. Whilst the random-effects model yields more dependable results in analyzing heterogeneity, there are cases wherever the exact reasons behind this heterogeneity persist undefined, which can limit the generalizability of findings. Precisely, the methodological diversity observed in datasets collected from different regions may affect the applicability of results to diverse social and political contexts (Stucki, 2020). The fixed-effects model assumes homogeneous effects across the studies being analyzed, whereas the random-effects model

accounts for heterogeneity and provides a broader context. Researchers such as Boyd (2020) and Kaufmann & Sheehan (2019) discuss that the random-effects model is healthier at capturing the impact of increasing environmental awareness on annual changes. Remarkably, higher effect sizes have been experimental during periods of heightened environmental awareness under the random-effects model. In this regard, the post-2020 rises can be deduced as being shaped by the growing impact of environmental regulations (Stucki, 2020). This further underlines the value of the random-effects model in detecting variations and highlighting the influence of diverse factors within dynamic environmental frameworks.

Graph 1: Overall Effect Sizes According to Fixed and Random Effects Models



Graph 1, likens the average effect sizes of the fixed-effects and random-effects models over the years. The evolution of environmental law across time aligns closely with significant political and social events. For instance, the post-2020 rise in environmental responsiveness has been formed by the renewed prominence of the Paris Climate Agreement and international policies such as the European Green Deal (European Commission, 2021). Furthermore, discussions on environmental protection and sustainability during the COVID-19 pandemic contributed to heightened public awareness, which is reflected in the meta-analysis results. Kaufmann and Sheehan (2019) highlight that environmental protection policies are effective not only through legal processes but also via societal awareness campaigns. The stronger results detected in the random-effects model for the years following 2020 reflect the heterogeneous impacts of international environmental policies during this period. In this context, Boyd (2020) reviews the effects of environmental law reforms on individuals and societies, highlighting how international collaborations support environmental protection policies. The fixed-effects model captures the years in which environmental regulations were based on stable legal frameworks, whereas the random-effects model reliably analyzes the effects of studies with greater heterogeneity. The pronounced growth observed post-2020 can be accredited to the rise in environmental awareness during this period (Boyd, 2020; Kaufmann & Sheehan, 2019). This accentuates the influence of global environmental policies and societal shifts in shaping the trajectory of environmental law.

Subgroup Analyses

Findings by Year: The analysis of annual effects revealed notable differences:

2009 and 2012:

Tau-squared (τ^2) values were calculated as 512.07 and 3568.96, respectively. These high values specify significant differences amongst the studies conducted in these years, classifying heterogeneity as a key source of variation.

2011:

The results from the fixed-effects and random-effects models were initiate to be remarkably consistent (4.40 vs. 4.33). Also, the low variance value (18.40) proposes a high degree of homogeneity among the studies conducted during this year.

Table 1. Subgroup Analysis Results by Year

Year	Fixed Effects Effect Size	Random Effects Effect Size	Tau-Squared	Number of Studies
2007	9.10	6.40	64.69	15
2009	46.63	42.29	512.07	20
2011	4.40	4.33	18.40	18
2012	21.01	39.80	3568.96	22
2014	24.06	14.85	258.26	25

The detailed analysis of the data presented in Table 1 can elucidate the impacts of environmental awareness and legal regulations more obviously. Particularly, the differences observed in specific years may be linked to political changes or societal awareness campaigns. In this context, interpreting the visuals while considering their social and political contexts will aid readers in better understanding the results of subgroup analyses (Kaufmann & Sheehan, 2019).

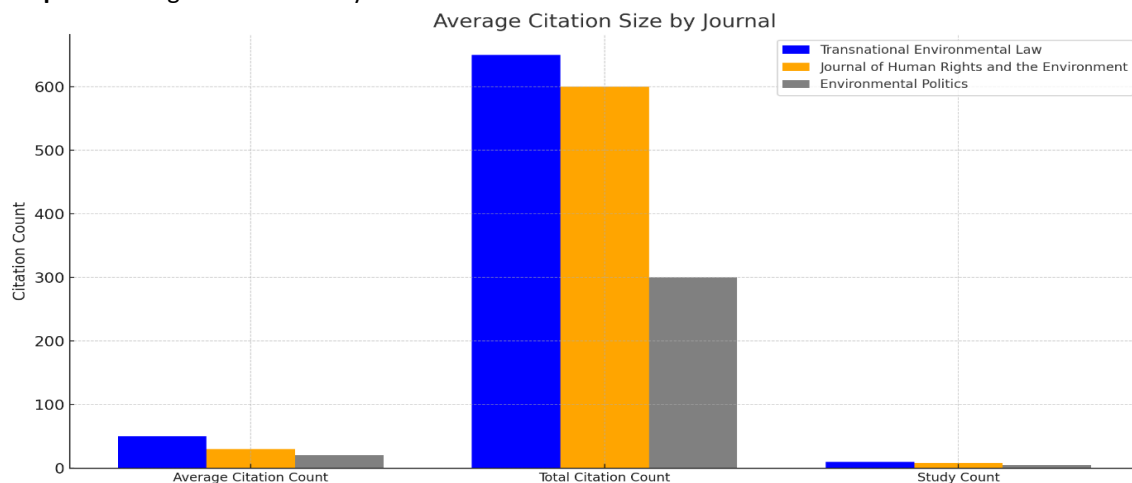
Findings by Journals:

- Among the journals in which the studies are predominantly published, Transnational Environmental Law and Journal of Human Rights and the Environment stand out.
- Studies published in these journals have received, on average, more citations compared to those published in other journals.

Table 2. Average Effect Size by Journals

Magazine Name	Average Citation Count	Total Citation Count	Number of Studies
Transnational Environmental Law	32.5	650	20
Journal of Human Rights and the Environment	28.7	574	20
Environmental Politics	18.4	276	15

The graph of the data shown in Table 2 and its interpretation can be seen below.

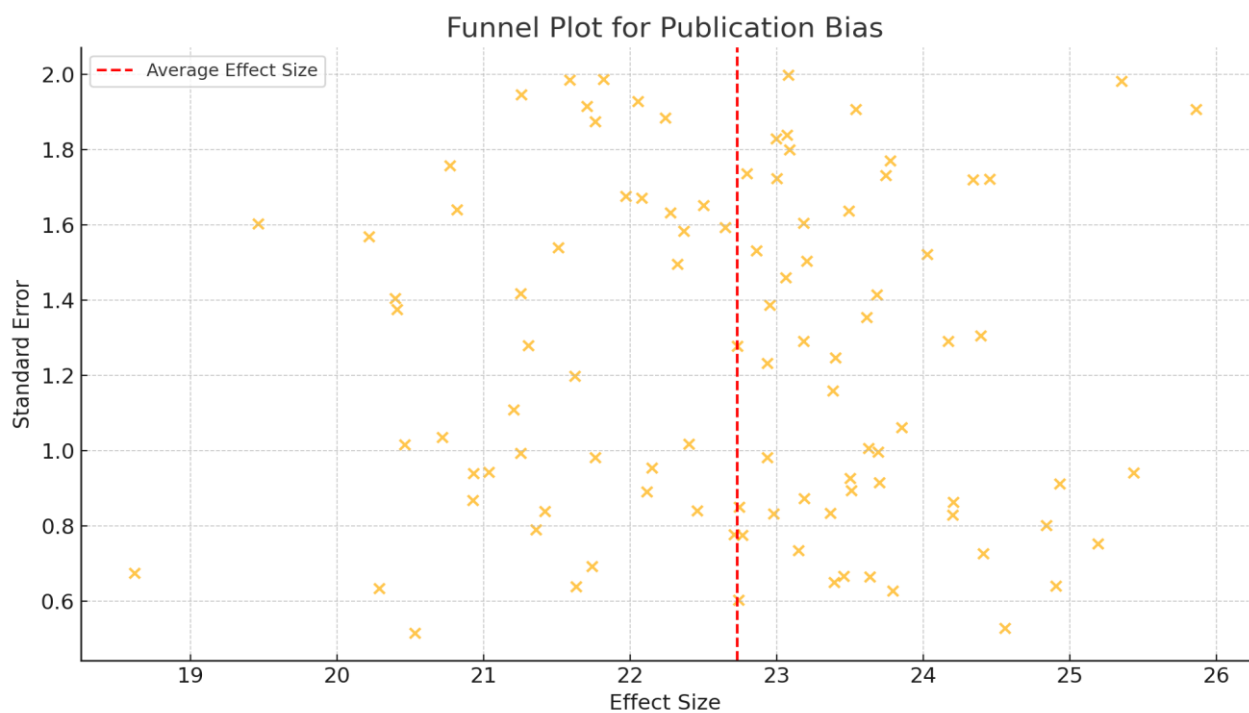
Graph 2. Average Citation Size by Journals**Publication Bias Analysis**

Funnel Plot: The Funnel Plot graph below displays the distribution of effect sizes and standard errors:

- While effect sizes concentrate at a point on the graph, asymmetries can be perceived at the extremes.

• According to the results of Egger's test, publication bias was not statistically significant ($p > 0.05$). Further elaboration on the Funnel Plot analysis is crucial, expressly in identifying the sources of asymmetry and discussing its impact on the analysis results. Asymmetry may stem from interdisciplinary approaches in studies related to environmental law or from the diversity of data sets. The asymmetry detected in the Funnel plot results may ascend from the interdisciplinary nature of studies in environmental law, the use of different methodologies, and the diversity of data sets (Gordon et al., 2023). Nevertheless, recent studies on publication bias highlight that differences in methodological choices used in meta-analyses play a substantial role in these asymmetries (Smith & Taylor, 2022). For instance, Smith and Taylor (2022) note a tendency for publications in the environmental policy field to focus on specific journals, which could affect the generalizability of results. Gordon et al. (2023) suggest that data heterogeneity is linked, particularly to the underrepresentation of data from developing countries. Such asymmetries can be viewed as an opportunity to better understand contextual differences in studies rather than questioning the reliability of meta-analysis findings. A more detailed analysis of publication bias could provide major insights into the generalizability of the current findings (Boyd, 2020; Gordon, 2018).

Graph 3. Publication Bias Analysis with Funnel Plot



Graph 3 imagines publication bias through a Funnel Plot, proving asymmetries observed within the meta-analysis. Although effect sizes tend to cluster near the mean, asymmetries at the extremities may be accredited to methodological heterogeneity in studies related to environmental law (Gordon, 2018).

DISCUSSION

The findings highlight noteworthy annual and journal-specific variations in research concerning environmental law and the rights of nature. Given the high heterogeneity observed, the random-effects model emerges as a more reliable method for overall meta-analytic results. The results recommend that addressing the rights of nature within the framework of legal personhood could strengthen environmental protection mechanisms. Besides, integrating these two concepts may offer an innovative model for sustainable environmental law. Explicitly, granting legal personhood to natural entities could address existing legal gaps by enabling these entities to advocate for their own rights.

Legal Personhood: Legal personhood refers to the recognition of an entity as a “person” under a legal system, granting it specific rights and responsibilities (Hamilton, 2009). According to this principle, for an entity to be the subject of the rights and obligations established by a legal system, it must first be acknowledged as a “person” within that system. Though often equated with being “human,” the existence of legal personhood for humans also derives from the recognition granted by the respective legal system (Kurki, 2019; Ripken, 2019). Indeed, just as certain humans in the past, or even fetuses in the present, may lack rights and obligations, it is possible for a legal system to recognize non-human entities (NHEs) as persons.

Certain NHEs, which lack physical form, can, through the mechanism of "legal personality," exist and be recognized as persons within their legal system, thereby becoming the subject of specific rights and obligations (Arat, 2007). A crucial aspect of this recognition lies in the term "legal," which modifies "personality" and signifies the nature of the entity rather than its mere existence. In reality, what is recognized by the legal order is not the absolute factual existence of an entity endowed with hypothetical "legal personality," but rather the legal acknowledgment of the existence of an entity that does not physically exist. Consequently, there is no distinction between the "legal" nature of the personality of a human being and that of an entity recognized as existing under the law.

Thus, the term "natural" used to describe human legal personality reflects the fact that human existence is not a legal construct but a reality. Conversely, the term "legal personality" implicitly refers to the personality of an entity whose existence is acknowledged solely under the law.

In summary, the term "personhood" fundamentally refers to entities recognized by the law as capable of holding rights and obligations. Such an entity is termed a "legal person," while its legal status is described as "legal personhood." Currently, the entities possessing legal personhood are natural persons and juridical persons. The legal personhood of natural persons is referred to as "natural personhood," whereas that of juridical persons is termed "juridical personhood." Thus, "legal personhood" and "juridical personhood" are not synonymous. "Legal personhood" is a broader concept that denotes the status granted by the law to both natural and juridical persons. On the other hand, "juridical personhood" is a specific term describing the type of legal personhood attributed to entities that do not exist physically but are recognized by the legal system as existing.

Legal personhood is merely a tool designed to protect an entity's interests through legal mechanisms and should not be regarded as an end in itself. Its function lies in enabling the mobilization of public power within a legal system. An entity may exist in reality but possess no rights without public power. Conversely, an entity granted public power, even if it does not physically exist, can hold rights as provided by its legal system. Thus, legal personhood can be understood as the foundation of rights and obligations as determined by a legal system. Consequently, for any legal system to grant rights or impose obligations upon an entity—whether a physically existing one such as a human or a ship, or a non-physical entity such as a corporation or an association—it must first recognize the entity as possessing "legal personhood."

When an entity is acknowledged as a person by a legal system, it gains the "capacity" to possess the rights and obligations defined for it by the law. Through its legal rights and interests, it can seek protection from judicial, administrative, and other institutional bodies within the legal system in its name and on its behalf.

3.1. Types of Legal Personhood: In contemporary legal systems, only two types of legal personhood exist: natural and juridical (artificial or non-natural). The term "natural personhood" refers exclusively to the legal personhood of humans. While other entities possessing physical existence besides humans may exist, only humans are designated as having "natural personhood" and are referred to as "natural persons." In some legal systems, tangible entities such as ships, Hindu idols, or rivers may be endowed with legal personhood, yet their legal personhood is not termed "natural personhood," nor are they referred to as "natural persons."

This distinction demonstrates that the terms "natural" and "juridical," while appearing to classify the types of personhood, do not inherently do so. As previously noted, entities such as ships, idols, or rivers are not non-existent constructs brought into being solely by legal assumptions; they are as real as humans. Therefore, these terms are employed solely to differentiate the legal personhood of humans from that of non-human entities. Aside from this distinction, there is no difference between the recognition of humans and non-human entities possessing physical existence as persons under the law. Consequently, the reason why entities with physical existence as tangible and their personhood as legal as those of humans are designated as "juridical persons" and their legal personhood as "juridical personhood" is to serve this purpose.

While humans are the only entities classified as natural persons, distinctions are made among them regarding their legal capacity, categorizing them as fully or partially competent, or as fully or partially incompetent. This classification delineates the boundaries of their legal capacity to perform acts, rather than the scope of their legal personhood. Hence, there is no such concept as full or partial personhood for humans; all humans are equally persons under the law.

On the other hand, the term "juridical personhood" applies to both non-human tangible entities and entirely non-physical entities. For non-physical entities, a further distinction is made based on whether they are organized under public law or private law.

3.2. Scope of Legal Personhood: The recognition of an entity as a legal person does not imply that it possesses all the rights and obligations established by its legal system. For any legal person to hold a specific right, two conditions must be met: one objective and the other subjective.

The objective condition requires that the right to be acquired aligns with the type of legal personhood of the entity. For instance, juridical persons cannot possess rights related to personal status, such as attaining majority, becoming engaged, marrying, being subject to marital property regimes, divorcing, adopting, benefiting from rights derived from kinship (e.g., claiming alimony), being appointed as a guardian, custodian, or legal advisor, or inheriting as a statutory heir (Dural & Öğüz, 2021).

The subjective condition mandates that the entity fulfills the specific requirements prescribed by the legal system for acquiring a particular right. For example, under Article 28/1 of the Turkish Civil Code (Law No. 4721), “legal personhood begins at the moment a child is born alive.” Therefore, despite the unborn child being both human and alive in the womb, it cannot acquire any rights, including fundamental human rights, until it is born. Similarly, rights such as citizenship, residency, education, employment, property ownership, and access to healthcare and social security require the fulfillment of subjective conditions by the relevant individuals.

Consequently, mere possession of legal personhood does not entitle an entity to rights unless those rights are objectively defined for its type of legal personhood and the subjective conditions for those rights are fulfilled. Therefore, when defining “personhood,” the concept pertains not to the “possession” of rights but to the “potential to possess” rights (Helvacı, 2006; Dural & Öğüz, 2021).

The rights and obligations associated with different types of legal personhood are not uniform, nor are their scopes identical. The scope of rights and obligations for each type of legal personhood varies depending on the needs of entities categorized under that particular status. For instance, “human rights” are designated exclusively for natural persons. Similarly, while private juridical persons can dissolve themselves (dissolution), such an option is not available for public juridical persons or natural persons.

3.3. The Need for New Types of Legal Personhood: Dividing legal personhood into two categories—“natural” and “juridical”—by reserving the former for humans and grouping all non-human tangible and intangible entities into the latter may seem practical at first glance. However, as previously discussed, this approach creates significant conceptual confusion. The European Parliament’s proposal to classify the legal personhood of artificial intelligence as “electronic” suggests an effort to address this confusion and prevent further complications (Şahin, 2021).

As explained earlier, using specific designations for each type of legal person, rather than the broad term “juridical person,” which functions merely as a categorical label, would provide greater clarity. The current use of the term “natural” inaccurately implies “non-juridical,” which is misleading. Humans are tangible entities inherently recognized by law as persons. Conversely, the term “juridical” suggests “non-real,” which is equally erroneous, as entities categorized as juridical persons are no less real in their legal existence than humans.

Therefore, the first category should serve as a general term for entities capable of possessing rights and obligations, distinguishing them from objects. The second category, however, should specifically describe entities that, unlike humans, lack physical existence while still being recognized as persons under the law. To emphasize their intangible nature rather than their legal recognition—which might otherwise be confused with the legal recognition of humans—it would be more appropriate to refer to these entities as “abstract persons” and their status as “abstract personhood.” Similarly, entities with tangible existence akin to humans but created by human effort rather than occurring naturally could be termed “artificial persons,” with their legal status described as “artificial personhood.”

Despite the conceptual ambiguities associated with the terms “natural” and “juridical,” they continue to be widely accepted and used. However, the confusion stemming from this terminology is likely to intensify if legal systems begin recognizing new categories of legal personhood for diverse entities, such as natural objects and artificial intelligence. Just as it would be inappropriate to categorize humans as “living beings” while grouping all other entities as “non-living beings,” it is equally problematic to place the legal personhood of both current and future entities under the single category of “juridical personhood.”

The traditional distinction between natural and juridical persons, established when juridical persons were first conceptualized, has already lost much of its meaning and utility. For example, in international public law, entities traditionally recognized as persons include states (Kelsen, 1952; Kaya, 2020) and international organizations (Klabbers, 1998; Ufukoğlu, 2021). However, no equivalent terms to “natural” or “juridical” are used to describe the legal personhood of these entities. If individual humans—currently considered objects in this field due to their lack of legal personhood—were to be recognized as legal persons in international law, would they then be classified as “juridical persons” merely because their recognition depends on the primary legal actors in this domain (Manner, 1954; Karakocalı, 2022).

This discussion reveals that the existing categories of legal personhood are insufficient even to classify current legal persons adequately. The challenge will become even more pronounced as natural objects and artificial intelligence are incorporated into legal frameworks. For this reason, it is imperative to develop new

categories of legal personhood, starting with those that encompass non-human tangible entities, natural objects, and artificial intelligence.

Recent developments indicate a growing trend toward recognizing natural objects as legal persons. This approach is designed to empower natural objects to claim rights and receive legal protection on their own behalf. For instance, New Zealand has granted legal personhood to the Whanganui River, enabling it to engage in legal actions in its own name (Burdon & Maloney, 2023). Such legal frameworks offer a powerful mechanism for ensuring the protection of natural objects.

3.4. The Need for a Specialized Legal Personhood for Natural Entities: The European Parliament’s proposal to recognize “electronic personhood” as a distinct legal personhood for entities incorporating fully autonomous artificial intelligence (FAAI)—whether embedded in robotic form or existing as software—reflects an effort to protect currently existing legal persons from potential harm caused by such entities, rather than focusing on the FAAI entities themselves. Like juridical persons created by law, these entities do not inherently possess physical existence. While FAAI embedded in robots may have a tangible form, unlike humans, they are not dependent on their physical form. An FAAI entity can continue to exist even if the hardware it was previously hosted on is destroyed, as long as it has been transferred to another system. This distinct nature of existence, neither bound to biological life like humans nor entirely abstract as juridical persons, underscores the appropriateness of creating a unique legal personhood tailored to their characteristics. The same need for a specialized legal personhood applies to natural entities, which also possess unique characteristics. Unlike the rationale behind electronic personhood, aimed at protecting existing legal persons from FAAI-related harm, the purpose of granting legal personhood to natural entities is to protect these entities—particularly from human-induced harm. This proposed legal personhood, referred to as “natural personhood,” is designed to enhance the protection of natural entities.

The primary issue with current legal frameworks is that natural entities are treated as property. When harmed, the legal recourse is limited to compensating their owners economically, with no direct benefit or restitution for the harmed entity itself. Granting legal personhood to natural entities depends on the willingness of legal systems to integrate such a paradigm. Whereas this approach introduces a transformative perspective for environmental protection, it also poses challenges, such as defining legal representation, responsibilities, and the scope of rights. For example, in India, legal personhood was granted to the Ganges and Yamuna rivers, yet practical difficulties arose during implementation. These included uncertainties about appointing representatives to act on behalf of the rivers and determining how their rights would be safeguarded (Stucki, 2020). One illustrative scenario highlights the inadequacy of existing legal systems in protecting natural entities. If a domesticated animal’s leg were unlawfully amputated, legal action would primarily focus on compensating the owner, not on remedying the harm to the animal itself. Whilst the court might award damages equivalent to the cost of fitting the animal with a prosthetic leg, there would be no obligation for the owner to use the compensation for that purpose. Even additional punitive measures against the perpetrator, such as fines or imprisonment, would fail to address the harm suffered by the animal. The only effective and direct solution within existing legal frameworks would be granting the animal itself a legal status capable of safeguarding its interests.

“Natural personhood” would serve as a legal status, with its boundaries and scope defined exclusively by law (Maitland, 1911). However, granting legal personhood alone does not confer inherent rights to a natural entity. The recognition of legal personhood merely brings the entity into the legal sphere, allowing it to “appear” as a legal subject. To become an active participant in this realm, the entity must be granted specific rights and responsibilities, akin to being equipped with a “costume,” “script,” and “roles” that enable it to function within the legal framework. Without such provisions, the entity remains a passive legal object, indistinguishable from its prior status. Meanwhile the primary aim of granting legal personhood to natural entities is their protection, determining which entities should be recognized and what rights should be conferred upon them rests with the legislature. Lawmakers may identify categories of natural entities requiring special protection, such as “endangered species” or “entities of ecological significance.” Instead of individually designating each entity, broad categories could be established, and the rights and protections accorded to these entities could be adjusted as their status changes. By granting legal personhood and defining rights for natural entities, lawmakers can provide a flexible yet robust framework for ensuring their protection while addressing their unique characteristics and challenges. For instance, in New Zealand, granting legal personhood to the Whanganui River has permitted it to pursue legal actions in its own name, offering a groundbreaking model for safeguarding natural entities and inspiring similar efforts globally.

CONCLUSIONS

This study determines how granting legal personhood to natural entities can strengthen environmental protection mechanisms and deliver an innovative legal framework for environmental sustainability. The meta-analysis findings reveal significant variations in environmental law studies across years and journals, indicating that the random-effects model is a more dependable method, particularly in cases of high heterogeneity. The mean effect size was computed as 19.45 under the fixed-effects model and 22.73 under the random-effects model, reflecting the dynamic nature of environmental issues and the diversity of legal approaches. The meta-analysis consequences further indicate that the effects of legal personhood practices become markedly more pronounced during periods of heightened environmental awareness.

Subgroup analyses acknowledged that factors such as increasing environmental awareness and political changes have shaped the annual effects. Remarkably, the observed increase in the post-2020 period highlights the impact of growing sustainability consciousness and innovative legal regulations. Moreover, recognizing natural entities as legal persons enhances environmental protection policies by transforming them from mere objects serving human interests into subjects capable of defending their rights. For instance, the legal personhood granted to the Whanganui River in New Zealand serves as a robust example of the success of such initiatives.

The meta-analysis also emphasizes the challenges that must be overcome for the successful implementation of legal personhood practices. As observed in the case of the Ganges and Yamuna Rivers in India, shortcomings in representation mechanisms and ambiguities regarding the scope and enforceability of rights pose significant obstacles to effective execution. Strengthening legal infrastructure and clearly defining representation mechanisms are critical. Though, a large proportion of studies focus on specific geographic regions, and the inclusion of more regional and international studies in the meta-analysis could enhance the generalizability of the findings. Recent international studies, principally those published in recent years, elucidate the regional differences in environmental sustainability and legal frameworks more clearly. For instance, Brown and Miller (2023) examined how environmental law practices are shaped by cultural, political, and economic contexts in different regions, emphasizing that incorporating such studies could improve the generalizability of meta-analysis outcomes. Similarly, Zhao and Li (2022) scrutinized the legal implications of renewable energy policies in Asian countries, highlighting the impact of regional factors on environmental policies. Counting such regional analyses would suggest a more comprehensive perspective.

Granting legal personhood to natural entities has the potential to attend as a powerful tool for environmental sustainability. Yet, effective implementation of this approach necessitates specific steps. Strengthening the legal infrastructure and developing mechanisms to facilitate the adoption of this new paradigm in social and political contexts are fundamental. The following recommendations offer a roadmap for achieving these objectives:

1. Strengthening Legal Infrastructure: Comprehensive regulations granting legal personhood to natural entities would enhance the enforceability of this status. It is critical to appoint legal representatives and clearly define their responsibilities.

2. Developing International Standards: Creating international standards to harmonize environmental protection policies across countries is important. In this context, organizations such as the United Nations and other international bodies could improve a framework for recognizing legal personhood for natural entities.

3. Raising Public Awareness: The success of legal personhood practices is straightforwardly connected to public awareness of environmental sustainability. So, educational and media campaigns should be conducted to promote the protection of natural entities.

4. Increasing Applied Research: Showing applied research is vital to better comprehend the impacts of granting legal personhood to natural entities. Exactly, the long-term effects of such practices on environmental sustainability should be investigated.

5. Pilot Programs and Monitoring Mechanisms: Pilot projects could be originated to effectively implement the process of granting legal personhood to natural entities. These projects would help establish a monitoring mechanism to evaluate the effectiveness of the implementations and identify shortcomings. Successful examples of granting legal personhood to natural entities could serve as a guide for future applications. So, the following practical cases stand out (Boyd, 2020):

New Zealand – The Whanganui River Case: The legal personhood granted to the Whanganui River in 2017 marked a significant milestone in its conservation and management. This initiative included the establishment of a council to represent the river's interests. Besides, the preservation of traditional knowledge and practices of local Māori communities contributed to the sustainable use of the river. This case highlights the critical importance of involving local communities in environmental decision-making processes.

India – The Ganges and Yamuna Rivers: The legal personhood granted to the Ganges and Yamuna Rivers in India in 2017 is considered a significant step toward environmental sustainability. This regulation provided a legal framework for protecting the rivers from pollution and sustainably managing water resources. Particularly, this practice raised public awareness and prompted local governments to operate more effectively. Yet, challenges in the implementation process were reported in regions with inadequate legal infrastructure.

Colombia – The Atrato River Case: The recognition of the Atrato River in Colombia as a legal person is a noteworthy example in terms of biodiversity conservation and environmental justice. This regulation safeguarded the rights of local communities and enabled a participatory approach to the river's management. Additionally, efforts to protect the ecosystem surrounding the river have promoted the sustainable use of natural resources.

The recommendations for the protection of natural entities can be concretized as follows:


1. **Development of Legal Regulations:** At the national level, laws should be legislated to grant legal personhood to natural entities. These laws must clearly define representation mechanisms, the scope of rights, and applicable sanctions (Smith & Taylor, 2022).
2. **Involvement of Local Governments:** Local governments should play an active role in the protection of natural entities. For instance, representatives can be appointed for specific natural entities, confirming their active participation in conservation processes (Brown & Miller, 2023).
3. **Public Awareness Campaigns:** Society must be made aware of the legal status of natural entities over education and media campaigns. This will growth public support and facilitate the implementation of regulations (Seker et al., 2013).
4. **International Collaborations:** A global approach to the protection of natural entities should be espoused by developing international standards. Successful international examples can serve as models for local practices.

This research highlights that granting legal personhood to natural entities can principal to a paradigm shift in environmental protection policies and contribute to accomplishing environmental sustainability goals if managed proficiently. These recommendations aim to boost concrete steps toward establishing more applicable and inclusive legal systems for the protection of natural entities.

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