Original article

http://dx.doi.org/10.18623/rvd.v22.n1.2987

CULTURAL MATERIALISM AND FOREST MANAGEMENT

MATERIALISMO CULTURAL E GESTÃO DE FLORESTAS

Article received on: 05/26/2023
Article accepted on: 30/01/2024

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The authors declare that there is no conflict of interest

Abstract
This article analyzes the management of public forests in Brazil from the perspective of cultural materialism, highlighting the overcoming of idealistic approaches in environmental protection. Using an analytical method, the study assesses the legal effectiveness and normative security of forest concessions, focusing on Law No. 11,284/2006 and Decree No. 12,046/2024. The research shows that the integration between infrastructure, structure, and superstructure is essential for the effectiveness of environmental norms. Strengthening subsistence mechanisms and economic incentives for forest concessions, especially financial ones, combined with increasing cost and hindering illegal exploitation, through public inspections, is an appropriate way to effectively change production patterns favorable to sustainability, with the structural overcoming of predatory patterns. It concludes that forest concessions, when aligned with material and social conditions, are effective instruments for promoting sustainability and combating illegal deforestation.

Keywords: Forest Concessions. Sustainable Development. Environmental Law. Forest Management. Cultural Materialism.

Resumo
Este artigo analisa a gestão de florestas pú- blicas no Brasil sob a perspectiva do materialismo cultural, destacando a superação de abordagens idealistas na proteção ambiental. Utilizando método analítico, o estudo avalia a eficácia jurídica e a segurança normativa das concessões florestais, com foco na Lei n. 11.284/2006 e no Decreto n. 12.046/2024. A pesquisa demonstra que a integração entre infraestrutura, estrutura e superestrutura é essencial para a eficácia das normas ambientais. Reforçar mecanismos de subsistência e estímulo econômico às concessões florestais, sobretudo os financeiros, aliando-se ao aumento de custo e à dificuldade para a exploração ilegal, a partir de fiscalizações públicas, é via adequada para a efetiva alteração dos padrões produtivos favoráveis à sustentabilidade, com superação estrutural dos padrões predatórios. Conclui-se que as concessões florestais, quando alinhadas às condições materiais e sociais, são instrumentos eficazes para promover sustentabilidade e combater o desmatamento ilegal, apresentando-se como alternativa contundente para enfrentamento da crise ambiental contemporânea.

Palavras-chave: *Concessões Florestais. Desenvolvimento Sustentável. Direito Ambiental. Gestão Florestal. Materialismo Cultural.*

1 INTRODUCTION

Debates and dialogues on sustainability cannot advance without economic analysis, particularly when grounded in the fundamental parameters of environmental or ecological economics. At the same time, it is also necessary to situate institutional debates within a regulatory sphere, in a legal framework attuned to historical and cultural substance, as well as to an anthropological perspective. This article proposes an analysis of public forest management based on cultural materialism. The legal instruments regulating the use of public forests are framed within an approach to the productive process that employs natural resources in regulatory assessments of the satisfaction of immediate human needs, without disregarding the management of future forest resource production.

The debate over the value of environmental goods, and their application, requires not only consideration of their existence value but also acknowledgment of their direct and indirect use values. An idealist perspective on natural resource exploitation or environmental conservation is insufficient for effective ecological management. Dialogue between law and sustainability—across the diverse scien- tific fields engaged with environmental issues—and with economics, particularly environmental and ecological economics, depends on the creation of effective mechanisms for managing environmental goods. To this end, an anthropological perspective is essential to connect natural resource management with anthropological frameworks, thereby enabling a more substantive evaluation of regulation as articulated through legal instruments.

This article engages in an analysis of sustainability through both the direct and indirect use value of forest resources in the context of forest management. It proposes an interdisciplinary debate, connecting aspects of anthropology linked to cultural materialism, with the regulatory aspects of public forest management.

In this way, economic aspects are addressed within an anthropological framework aimed at providing pragmatic yet comprehensive and critical support for ecological management.

Specifically, the study addresses the management of public forests for sustainable production, relying primarily on Law No. 11,284/2006 and Decree No. 12,046/2024. The problematic framework arises from the implications of legal certainty and the strengthening of trust in the management of forest resources. The central problem is to

what extent public forest management provisions are connected to prescriptions of legal effectiveness grounded in practical reason, sustained by cultural materialism and the generation of economic effects.

Through an analytical method, the article examines the norms governing public forest management in order to assess references of legal certainty and effectiveness that must be particularly safeguarded. It begins with an approach rooted in cultural materialism, disentangling the bases of idealism as insufficient to guarantee the effectiveness of ecological protection instruments. Thus, the aim is to outline cultural materialism as capable of supporting a solid and pragmatic per- spective of environmental protection, deriving from the value of natural resources and from an understanding of normative effectiveness shaped by the material conditions experienced in a society situated in time and space. In methodological terms, data from public agencies responsible for forest management are assessed, along with critical doctrinal elements, linking them to economic management alternatives developed by financial agents.

Subsequently, the article evaluates and analyzes Decree No. 12,046/2024 and its regulatory correlation with Law No. 11,284/2006, the norms that regulate the management of public forests in Brazil. The guiding problem is framed by the following central questions. To what extent can benchmarks of effectiveness and legal certainty be established, to be valued as protective measures to foster the sustainable use of natural resources in public forests? Can cultural materialism, applied to environmental management, provide stronger foundations than environmental idealism, yielding environmental quality gains and accounting for the problematic dynamics of ecological goods protection? In summary, the article seeks to identify the critical points of forest management that should be reinforced through evaluations of the material conditions governing society, which affect the potential effectiveness of norms. This approach enables readings of efficiency grounded in cultural practices that may enhance the effectiveness of environmental norms and institutions. It is argued that a great deal of the ineffectiveness of ecological protection stems from idealistic schools of thought. A cultural materialist approach to environmental issues is proposed, with the aim of addressing the efficiency deficit in the protection of ecological goods.

2 CULTURAL MATERIALISM IN ECOLOGICAL PROTECTION

Ecological protection and its related legal institutions always bring an underlying question of internal risk, which aligns with the dynamics of the society of risk in its plurality of effects. The risk initially addressed here is that of ineffectiveness, of the legal norm failing to achieve even a minimum level of social effectiveness in its application, subjecting the protective legal order to disenchantment (Beck, 2010). Positivist argumentative responses may resort to sanction, to the possibility of wielding the legal system in its punitive or even intimidating dimension through state organizations, alongside emotional appeals to the morally expected conduct of the subject, idealistically conceived. From this perspective, the application of legal penalties would serve as a refuge for repeated violations experienced in society.

If the positivist and normativist perspective can focus its attention on sanction, sociological and anthropological aspects have already shown that repetitive social practices cannot be dismantled solely through punitive measures. Escape valves from state repression can and do function. Patterns of social deviation tend to spread, and in the complex dimension of social phenomena, state ubiquity will always prove flawed when confronted with an established script of parallel social order. Anthropological and sociological critiques are clear regarding the insufficiency of legal norms to effectively achieve, through sanction, the efficacy of platforms of socially desired conduct. Ecological protection would always remain deficient if dependent on a sanctioncentered normativist model, which carries within itself an idealist foundation in social performance.

Other aspects linked to idealism may also claim levels of effectiveness and social persuasion, especially those tied to a moral identification with correctness (Kant, 2003), commonly associated with Kantian thought (Salgado, 1995). While Kantian thought contains elements of practical reason, the power of Kantian idealism lies in its constructivism. Through this lens, rational thought and ideal constructions can influence human agency to the point of shaping individual and collective conduct. This reveals a fundamentally philosophical character that diverges from historical and sociological foundations. According to Habermas (2004), these constructions, derived from the exercise of reason and developed through arguments—or better arguments, even intersubjectively—can provide persuasion by their impact in the public sphere.

The moral value of reason, in its greatest universalizing production of meaning, would be capable of provoking changes in social action or reaction, a remodeling of the socioeconomic order, a redefinition of organizations and operational practices in society and community. The system of moral duty transferred to legal duty of action would constitute an impulse capable of ensuring environmental protection. The maxims of human action are duties to be projected onto reality, even though their driving impulse is located in the field of agency (O'Donnell, 2011) or even of the spirit. Here lies the Hegelian idealist dimension (Hegel, 2002). Throughout this set of perspectives, there is a substratum, whether immediate or mediate, tied to idealism and its weight of a priori judgments[1]. This background of understanding and implication hinders or prevents the consideration of material factors or conditions that may constitute obstacles to impulses in the protection of environmental goods, particularly forests.

In light of these worldviews and the application of legal provisions, this work proposes a critique and a basis of understanding developed through cul- tural materialism (Sá, 2011), grounded in the theoretical references of Marvin Harris (1994). Cultural materialism can be understood as "an anthropological paradigm founded on materialist and Marxist thought (though not limited by it)"[2] (Marconi & Presotto, 2019, p. 203, free translation). Cultural materialism stands as a counterpoint to the idealist perspective and as a critique of the moralist perspective, including those of Kantian and Hegelian origins, given their distance and detachment from the material conditions experienced in human practices and organizations. In other words, material and collective life substrata would serve as the matrix for the development of worldviews and for philosophical and legal constructions in their realization.

Economic and legally institutionalized conditions, conditional perspectives of social esteem, self-respect, and self-confidence (Honneth, 2003), grounded in intersubjective flows within the social environment, are responsible for the pre- vailing cultural model and for its reflections in a legal model of effectiveness. The material basis will be the source of irradiation both for culture as a whole and for legal culture.

[1] "The a priori judgment is defined as one that is independent of all concrete perception and any experience. It is the product of an intellectual intuition, or intellection, that immediately apprehends an object as it presents itself " (Adeodato, 2002, p. 28, free translation).
In the original: "O juízo a priori é definido como aquele que independe de toda percepção concreta e de qualquer experiência. Ele é produto de uma intuição intelectual, ou intelecção, que apreende imediatamente um objeto que se apresenta".

[2] In the original: "um paradigma antropológico fundado sobre o pensamento materialista e marxista (mas não por ele limitado)".

Environmental legal protection is thus placed within this framework of possibility for realizing its potential effectiveness. Tangible and material factors of human possibilities and aspirations, including scarcity, are determinants of the effectiveness of cultural practices, including legal ones. Material factors and elements are more relevant and prominent than ideal or moral implications, which are not detached; on the contrary, they are situated within the framework of factors linked to the environment, technology, and economic systems.

In contexts where income generation is necessary and the exploitation of natural resources is a viable way to achieve social and personal goals, idealistic values are bound to fail due to their lack of material grounding. This is the essence of Marvin Harris's (1994) critique of psychological and cognitive idealism. Idealist theories focus on the primacy of abstract, universal human rationality or emotionality. They treat social structure, infrastructure, and superstructure as a product of rational schemes that mold them to fit an ideal, rather than being shaped by real-world conditions.

The problem of preservation, conservation, and ecological protection can be legally addressed through cultural interpretations that incorporate economic and moral primacy, rather than treating moral correction as a prior or independent element. According to Harris (1994), psychological idealist interpretations seek to ground the difference between peoples or societies in their modal personality. Thus, in the Brazilian context, an image would persist that "the Brazilian people" act in manner Y or Z, or that "norm W takes hold or does not take hold socially". Here we have a sociocultural causality with ecological effects. In Harris's words (1994, p. 285, free translation), "a popular set of psychological theories on so- ciocultural causality is based on the assumption that every society has a national character, a modal personality, or some other defined type of personality"[3].

For Harris (1994, p. 286, free translation), in analyses of cultural materialism, "personality configurations are the result of infrastructural conditions and, although there is feedback between these configurations and the infrastructure, the latter constitutes, probabilistically, the dominant factor"[4]. Cultural materialism proposes that the material

[3] In the original: "un popular conjunto de teorías psicologistas de la causalidad sociocultural parte del supuesto de que toda sociedad posee un carácter nacional, una personalidad modal o alguna otra definida de tipos de personalidad".

[4] In the original: "las configuraciones de personalidad son producto de condiciones infraestructurales y que, si bien existe uma retroalimentación entre estas configuraciones y la infraestrutura, la segunda constituye, probabilisticamente, el factor dominante".

conditions of real and practical existence of the subject and the collectivity in their social and environmental surroundings will be the foundation and the roots to cultural practices and affect legal practices.

Constructions of correctness that are not linked to or do not affect the integration of practical and real existence will fail in their claim to effectiveness.

Harris introduced the concepts of infrastructure, structure, and superstructure. Infrastructure concerns the essential basis for the survival and existence of the subject on both individual and collective scales, considering distributive factors of goods (Harris, 1994) as well as the social recognition derived from them (Honneth, 2003). This means that material existential dynamics will imply factors of respect or disrespect within the collectivity (normative-legal matrix) and factors of social esteem or disesteem (social value matrix) (Honneth, 2003). Infrastructure varies with the set of technologies or techniques available or possible for the production or acquisition of goods and services. The same applies to the relationship with the environment, the acquisition of natural resources, and their conversion into satisfaction of needs, as well as to the dimension of social organization in which both subjects and the collectivity are situated. Infrastructure provides the material bases for materialism, extending its influence over more complex spheres. Populations focus on their existential reproduction, a process that is self-sustained within a spiraling system

As Harris (1994, p. 67, free translation) points out, "first, societies must face the problems of production, i.e., behaviorally satisfy the minimum requirements of production for subsistence"[5]. A mode of production is thus established articulating itself in a feedback loop directed toward the reproduction of the subject and the collectivity. Next, the foundations are laid to "maintain secure and orderly behavioral relations among their constituent groups and with other societies"[6] (Harris, 1994, p. 68, free translation). The interpretive dimension is essentially practical and rational-pragmatic, not rationalidealist. Symbolic and argumentative processes follow the definitions of necessity.

[5] In the original: "en primer lugar, las sociedades deben hacer frente a los problemas de la producción, o sea, satisfacer conductualmente los requisitos mínimos de la producción, o sea, satisfacer conductualmente los requisitos mínimos de la subsistencia".
[6] In the original: "mantener relaciones conductuales seguras y ordenadas entre sus grupos constitutivos y con otras sociedades".

This point is crucial for the analysis of environmental protection. When the relationship between individuals and the collective is grounded in survival and the fulfillment of needs through practices recognized as predatory and environmentally destructive, the mere imposition of idealized behavioral standards or abstractly punitive or axiological legal approaches proves insufficient to alter the trajectory of ecological degradation within a self-consuming economic matrix.

The material matrices of infrastructure entail effects on structure and superstructure. Structure refers to the modes of organization and patterns of coexistence and action of subjects within the collectivity, of the collectivity toward subjects, and of the collectivity with itself, through intersubjective relations and the reproduction of social identities. Structure is shaped and molded by infrastructure: family organizations, individualities, patterns of education or cordiality, respect, or disrespect, as well as political and legal systems, institutions, and economic-ecological correlations, expressions of authority and subjection. All of these derive from the base of production and satisfaction of material needs, which are projected into standards of analysis of rightness or wrongness, of justice.

Harris (1994, p. 73, free translation) identifies infrastructure as

> […] the principal zone of interface between nature and culture, the frontier region where the interaction takes place between ecological, chemical, and physical constraints to which human action is subject, and the main sociocultural practices designed to try to overcome or modify such constraints[7].

In a community where a given natural resource is abundant and available, there will be no struggle for its possession, and disputes or regulatory identifica- tions will have little meaning. Conversely, ideal regulatory provisions may prove illegitimate and undeserving of credit due to infrastructural dynamics. A family whose only source of satisfying their need is the exploitation of vegetation will pursue this exploitation, regardless of whether the area is protected by law. This family, seeing the acts of restriction (founded in structure) of its need satisfaction and essential basis of existence (founded in infrastructure) as illegitimate. Thus, normative units tied to structural

[7] In the original: "[…] representa la principal zona interfacial entre naturaleza y cultura, la región fronteriza en la que se produce la interacción de las restricciones ecológicas, químicas y físicas a que está sujeta la acción humana con las principales prácticas socioculturales destinadas a intentar superar o modificar dichas restricciones".

conformations but lacking solid support in infrastructural material apparatus for acceptance and internalization will face serious risks regarding their effectiveness.

As Harris (1994, p. 74, free translation) points out, "unlike ideas, it is not possible to make patterns of production and reproduction appear and disappear"[8]. There is a rootedness among culture, social practices, interconnection with natural resources, and material existence. Thought itself, the idealist dimension, does not alter the practical scale of rationality of life and survival and its self-sustaining cycle.

Superstructure is projected on a reflective scale in individuals and in the collectivity. Organizational frameworks are projected and produced through reflections and critiques within the relations of subjects and collectivity. The field of ideas on morality and the criteria for social justice are shaped by the material and social base of infrastructure and structure. These ideas are then projected into legitimizing belief systems found in religious, ideological, artistic, educational, cultural, and theoretical domains. Thus, the development and redevelopment of the superstructure are directly linked to the foundations and transformations of both structure and infrastructure.

This is the main point of distance between cultural materialism and idealist paradigmatic constructions. Idealist lines of thought project ideological and theoretical formulations as self-sufficient factors, capable of altering reality in a detached manner, almost as if thought were to land upon the earth. In contrast, "the order of cultural materialist priorities—from infrastructure to other behavioral components, and lastly to the mental superstructure—reflects how these com- ponents progressively diverge from the nature/culture vertex"[9] (Harris, 1994, p. 72, free translation). Ideas can be the product of genius, of existing reality, or of a reality projected as possible. Yet, these constructions are always tied to what exists, even if it is an existence found in fiction.

On the other hand, their realization depends on a material context that makes possible, from the foundation of necessity and material possibility, the flow of sequential and scalar realization. Harris discusses, for example, the thought of Leonardo da Vinci. The Renaissance genius, between the late fifteenth and early sixteenth centuries, elaborated drawings later recognized as a germinal idea of what would become the

[8] In the original: "al contrario de lo que sucede con las ideas, no es posible hacer aparecer y desaparecer las pautas de producción y reproducción".
[9] In the original: "El orden de prioridades materialista cultural – de la infraestructura a los restantes componentes conductuales y, por último, a la superestructura mental – refleja como estos componentes se alejan progresivamente del vértice naturaliza/cultura".

modern helicopter. However, the idea could not assume a social and material existence precisely due to the absence of adequate material conditions for its propulsion, according to Harris (1994). More than that, it is precisely because of a conjunction of needs and material possibilities that realization became viable and today allows us to identify Leonardo da Vinci's project with what became the helicopter. Many other drawings, projects, and imagined expectations of the future devised in the past will not be remembered precisely because of the absence of infrastructure that could serve as a germinating and developmental basis to support mental or intellectual projections.

Cultural aspects and human achievements have material conditions of existence, without which they do not reach their potential for realization (Cortés, 2016). Thus, material, economic, natural, or ecological factors, as well as techniques themselves (which derive from technological bases of tools and mechanisms), constitute the starting point in the formation and transformation of institutions, social values, aspirations of rightness or wrongness, and of the legal order itself. Evidently, there is a struggle of ideas, beliefs, and values in face of reality. However, it is the dimension of possibility and potentiality of material needs and means that conditions the range of flows that ascend to the levels of structure and superstructure. In other words, mental constructions or reconstructions are not primary causes or matrices of cultural formulations or of law itself in a given collectivity situated in time and space, as Maximiliano (2002) had already recognized.

The interconnections of this paradigm of interpreting the world with environmental law are direct. Legal principles and rules, as well as legal hermeneutics itself, are tied to the material and structural conditions and possibilities of a society, according to its time and space of intra and intersocial interaction. The legal order is grounded in material conditions or factors, from which it is possible to determine the effectiveness or ineffectiveness of a norm. Legal constructions arising from idealism lack a substratum for anchoring and development. The effectiveness of normative provisions must, therefore, be supported by links that consider infrastructure, structure, and superstructure, both for purposes of realization and for purposes of value-based legitimation.

Legal regulations are rooted in material needs and factors, but their effectiveness depends on their correspondence and adequacy to these conditions, as infrastructure projects onto structure and superstructure. Consequently, ecological protection cannot be

achieved through idealist projection detached from the material conditions of needs and possibilities inherent in the infrastructure. From this paradigmatic support, we move on to the analysis of forest concessions within a functional perspective of ecological protection grounded in matrices provided by the material factors and needs of social groups.

3 FOREST CONCESSIONS AND CULTURAL MATERIALISM

Environmental protection cannot rest on idealistic expectations or moral projections detached from the material conditions of life. People of the present generations will not protect environmental goods meant for future generations if their children or families are in need. Nor will they do so if they lack economic alternatives or means of satisfying their needs that would enable conduct favorable to environmental preservation or conservation. Along these lines, cultural materi- alism requires that legal frameworks be conceived from their very foundation—in the fullest constructive sense—upon the material factors existing in a given society or collectivity, according to its lived time and space.

In line with cultural materialism, the legal institution and regulatory frame- work of forest concessions should be viewed as a means of protecting environmental assets, given their potential to satisfy social and economic needs. In other words, this effectively grounds legal institutions and frameworks, as well as value systems and perspectives of wellbeing and morality, in their structure and superstructure conditions. This, in turn, relates to the viable and functional support for existence contained within the infrastructure. The understanding of forest concessions as a sustainable use of natural resources inspires the cultural affirmation of social practices involving the utilization of timber resources and protection against deforestation (Araújo et al., 2017). This is precisely because illegal deforestation causes harm and damage to the sustenance and continuity of the livelihoods that are contained within the infrastructure.

Law No. 11,284/2006 governs the management of public forests for sustainable production (Brasil, 2006). The law's regulatory provisions were subsequently updated and restructured by Decree No. 12,046/2024 (Brasil, 2024a), which established new rules for: the National Register of Public Forests; the allocation of public forests to local communities; the Multiannual Forest Grant Plan; bidding processes and concession

contracts; the monitoring and auditing of forest concessions; and forest restoration and the use of credits from environmental services within forest concessions (Brasil, 2024a). Forest concession contracts are public in nature and establish reciprocal rights and obligations regarding the exploitation of forest resources in a public forest (Krell, 2023). Article 27 of Law No. 11,284/2006 provides that for each management unit put up for bidding, an exclusive concession contract will be signed with a single concessionaire, who is responsible for all contractual obligations as well as regular extra-contractual liabilities (Brasil, 2006).

Law No. 14,590/2023 amended Law No. 11,284/2006 by introducing key changes to the scope of concession contracts. A significant amendment was made to Article 2, paragraph 3, requiring the government to use all necessary means to prevent and suppress invasions in concession areas, both proactively and upon notification from the concessionaire. This is without prejudice to the concessionaire's own right to take measures for possessory protection (Brasil, 2023). The definition of a concession was also redesigned, directly impacting the scope and expectations of conduct under the contract. In Article 3, VII, it is now defined as the onerous delegation, by the granting authority, of the right to carry out sustainable forest management, forest restoration, and the exploitation of products and services within a management unit. This is specified in the object of the concession contract, which is awarded through bidding to a single legal entity (or consortium) that meets the tender requirements and demonstrates the capacity to perform, at its own risk and for a defined term (Brasil, 2023).

Repressing invasions and ensuring the profitability of forest concessions in terms of institutional and public security are crucial for providing, at the infrastructural level, the support necessary for the development of the institution and the effectiveness of the legal order in its regulatory dimension regarding the exploitation of timber resources. Economic support and material factors must be mobilized so that illegal activities are combated not only for being unlawful but also for constituting harm to the reproductive existence of material conditions sustaining the model.

Law No. 14,590/2023 also introduced, in Article 5, the possibility that concessions in conservation units, public lands, and assets of federative entities may include within their object the right to develop and commercialize projects for payment for environmental services and carbon credits (Brasil, 2023). This is regulated by Decree No. 12,046/2024 (Brasil, 2024a), whose Article 49 establishes that the rights to generate and

commercialize credits for environmental services, including carbon credits or similar instruments, within forest concessions, shall be transferred to the concessionaire through the concession contract, taking into consideration national commitments on climate change and applicable legislation (Milaré, 2011).

Among the essential clauses of concession contracts are those relating to their object, with a description of the products and services to be exploited and the management unit, as well as the concession period and the maximum time allowed for the concessionaire to begin implementing the management plan, restoration, and other agreed activities. While there are objective obligations, other obligations are framed with varying degrees of concreteness or open-endedness. The dynamics of concession contracts require constant adaptability, which cannot, however, be equated with instability or lack of legal certainty. This is justified, among other reasons, by the long duration provided for their development (Chules; Scardua; Martins, 2018), as well as by the need for institutional adjustments to variable realities that demand flexibility in regulatory discipline.

Article 35 of Law No. 11,284/2006 establishes that the duration of forest concession contracts shall be determined according to the harvest or exploitation cycle. It considers the product or group of products with the longest cycle included in the object of the concession, allowing a period of at least one cycle and at most forty years (Brasil, 2006). This highlights the link between the structural foundations and objectives derived from valuation in the superstructure and the existential and factual aspects of the production factors situated in the infrastructure. A static, immutable contract could not be expected over such a long period. Hence, provisions exist for future changes, improvements, and continuous modernization. Even in the case of concession contracts exclusively for the exploitation of forest services, with terms ranging from at least five to at most 20 years, the dynamics of modernization and adjustment remain present.

The provisions subject to further elaboration are even more significant in their impact on small legal entities, which have been brought into focus for expansion under the changes introduced by Law No. 14,590/2023. Article 33 of Law No. 11,284/2006 was amended to enhance the technical and economic feasibility of participation by small, micro, and medium-sized enterprises, taking into account the material conditions in which they operate (Brasil, 2023). Here, the intended expansion through concession lots with multiple management units of varying sizes is considered, established on the basis of technical criteria. These should reflect the conditions and needs of the forestry sector and

related economic sectors, regional specificities, the structure of production chains, local infrastructure, and market access.

The public authority, in its organizational role as grantor—with implications for its regular and special oversight activities in the administrative regulation of activities—must follow parameters of trust and adaptability that do not undermine the contract or its clauses, in line with the principle of objective good faith. This principle is reinforced by Article 1, paragraph 2 of Law No. 13,874/2019 (the Economic Freedom Law), which provides that all public regulations of private economic activity must be interpreted in favor of economic freedom, good faith, and respect for contracts, investments, and property (Brasil, 2019). Stimulating material engagement of stakeholders in the model is one of the law's primary objectives.

Article 40 of Decree No. 12,046/2024 provides that the Brazilian Forest Service, shall carry out the monitoring of forest concession contracts taking into account, among other aspects, compliance with the concession contract (Brasil, 2024a). The diversity of regulatory potential and the open-ended obligations typical of concession contracts create room for dialogue between their flexible provisions and the requirements of technical management and conformance, in order to meet expectations of stability and trust (Pinto; Vasconcellos; Rocha, 2015), which are essential premises of the contractual relationship. The model is designed to operate on the basis of the material conditions that shape the subject in economic relations involving natural resources.

4 FOREST CONCESSIONS: MATERIAL INFRASTRUCTURE FACTORS

Among the central objectives of forest concessions are the control of deforestation (Soares; Bezerra, 2021) and the sustainable use of timber resources. Far from the idealism and its currents of environmental protection that are detached from reality and from the existence linked to production factors, cultural materialism introduces a legal interconnection and effective action within the existential context of the material factors associated with anthropic activities. This provides a concrete pathway for the realization of the principle of environmental protection, without lapsing into ecological romanticism.

Indeed, the principles of forest management, established in Article 2 of Law No. 11,284/2006, include the implementation of activities that promote the efficient and rational use of forests. Moreover, they must contribute to the achievement of sustainable

development goals at the local, regional, and national levels and ensure stable and secure conditions encouraging long-term investment in forest management, conservation, and restoration (Brasil, 2006). Along these lines, it is necessary to consider that legal uncertainty (Sundfeld; Voronoff, 2018) in the application of forest concessions impacts the very management of the material factors underlying infrastructure. The ordering of state action is directed both toward the protection of ecological processes and environmental goods and toward the social and political structuring strategies aiming to establish management regimes with repercussions on production factors, with implications for the green economy (Wellen; Lima, 2013). The regulatory and oversight function reaches levels beyond the ordinary (Binenbojm, 2017). The state undertakes governance (Monkelbaan, 2019) of such ordering of action and also the analysis of forest data and information, primarily through the National Forest Information System (SNIF), under the Brazilian Forest Service, as provided in Article 55, V, of Law No. 11,284/2006 (Brasil, 2006). The SNIF sets forth the forest exploitation framework:

> The granted forest remains standing, as the contracts allow for the extraction of forest resources only through sustainable forest management techniques. Thus, the area is used in a rotational system, which enables continuous and sustainable timber production. On average, four to six trees are harvested per hectare, and the return to the same area will occur after 25 to 35 years, allowing the growth of the remaining trees[10] (Brasil, [20--], free translation).

The area under forest concession in Brazil is still small compared to the country's total forest area. Data from SNIF indicate the existence of only 22 concession contracts in operation at the federal level, distributed across "eight national forests (Jamari/RO, Jacundá/RO, Altamira/PA, Crepori/PA, Saracá-Taquera/PA, Caxi- uanã/PA, Amapá/AP, and Humaitá/AM), totaling more than 1.3 million hectares of public forests under sustainable production and representing 0.4% of forest area in the Amazon"[11](Brazil, [20--], free translation). Although the first contract was executed in 2008, the 1.3 million

[10] In the original: "A floresta concedida permanece em pé, pois os contratos firmados somente permitem a obtenção do recurso florestal por meio das técnicas do manejo florestal sustentável. Desta forma, a área é utilizada em um sistema de rodízio, que permite a produção contínua e sustentável de madeira. Em média, de quatro a seis árvores são retiradas por hectare e o retorno a mesma área ocorrerá após 25 a 35 anos, permitindo o crescimento das árvores remanescentes".

[11] In the original: "oito Flonas (Jamari/RO, Jacundá/RO, Altamira/PA, Crepori/PA, Saracá-Taquera/ PA, Caxiuanã/PA, Amapá/AP e Humaitá/AM), totalizando mais de 1,3 milhão de hectares de florestas públicas em regime de produção sustentável e representando 0,4% da área de florestas na Amazônia".

hectares remain relatively small, especially considering that public forest areas reached 327 million hectares in 2022 (Brasil, [20--]).

If the model receives sufficient incentives and adjustments to be effectively adopted as a large-scale economic practice, the economic gains within the infrastructure context will lend greater durability to normative and social organizational goals. Furthermore, expectations of value and ethical standards will emerge within both structural and superstructural domains. Along these lines, the practice of timber use and exploitation itself presents diversification possibilities, given the practical trend of aligning with bioeconomic practices established under Decree No. 12,044/2024, which instituted the National Bioeconomy Strategy (Brasil, 2024b).

The intent to act upon the material factors of technology, production, and the satisfaction of needs is made explicit in Article 2 of this decree. It defines the bioeconomy as a model of productive and economic development grounded in values of justice, ethics, and inclusion. Such a model is capable of generating products, processes, and services efficiently, based on the sustainable use, regen- eration, and conservation of biodiversity. It is guided by scientific and traditional knowledge and by their innovations and technologies, to add value, generate employment and income, ensure sustainability, and promote climate balance (Brasil, 2024b). In direct terms, forest concessions are aligned with the economic use of ecosystem resources, as regulated by Law No. 14,119/2021 (Brasil, 2021).

Establishing a productive system incorporating environmental protection as a core value provides grounds for efficiency and effectiveness that surpass idealistic and romanticized aspirations detached from the direct link between infrastructure, structure, and superstructure. Within this perspective, economic mecha- nisms play a key role. The National Bank for Economic and Social Development (BNDES) maintains a hub of projects connected to this economic dimension of valuing ecological goods as natural resources embedded in financial practices. Based on regulatory and environmental impact studies, BNDES governance embraces the thesis that forest concessions are an effective means of combating illegal deforestation and advancing environmental protection (BNDES, [202-]).

The main risk to the model’s effectiveness is the predominance of a natural resource exploitation system based on predatory use, in which illegal deforestation carries

lower costs and higher gains than reinforcing regular and lawful practices. The BNDES report highlights this concern: ([202-], free translation):

> The current scenario of operationalized concessions is far below its potential since the total area under concession currently accounts for less than 1% of the Amazon forest area.
> Among the obstacles to consolidating this instrument are the competition faced by sustainably managed timber from concession areas against illegally or predatory harvested timber, as well as the high investments required in logistical infrastructure for harvesting and transporting timber, since current concessions are concentrated in remote or hard-to-access areas of the Amazon.
> Nevertheless, sustainable exploitation through the forest concession regime, particularly in the Amazon, proves to be an important activity to be developed, as it can generate a significant volume of products, jobs, and revenues for both the public and private sectors, in addition to having the potential to boost the forest sector at the local, regional, and national levels[12].

Raising the individual economic cost of illegal exploitation, thereby undermining the infrastructural basis of its prevalence, creates an incentive to shift the dominant mode of exploitation toward concessions. In other words, it reshapes the assumptions underlying production factors, which in turn alter the cultur- al foundations of social practices. Hence the importance of financing sources. BNDES ([20--]) points to three potential financing sources for concession projects: (1) public and regional development banks; (2) debt and capital markets; and (3) private investments seeking economic gains from the enhanced value of goods commercialized through lawful exploitation. As a result, these three avenues would provide environmental protection by controlling illegal deforestation, not because it violates universal principles or idealistic protectionist values, but because illegal deforestation undermines production factors and the mechanisms driving the emerging economic matrix.

Bank financing sources may follow a system similar to that currently implemented by BNDES through the BNDES Finem – Meio Ambiente – Recuperação e Conservação

[12] In the original: "O cenário atual de concessões operacionalizadas está muito aquém de seu potencial, uma vez que a área total concedida atualmente corresponde a menos de 1% da área de florestas da Amazônia.
Entre os obstáculos para a consolidação desse instrumento, destacam-se a concorrência da madeira manejada de forma sustentável nas áreas concedidas com a madeira ilegal ou explorada de forma predatória e os altos investimentos em infraestrutura logística para exploração e escoamento da madeira, já que as concessões atuais se concentram em áreas remotas ou de difícil acesso na Amazônia. Todavia, a exploração sustentável por meio do regime de concessão florestal, em especial na Amazônia, mostra-se importante atividade a ser desenvolvida por ser capaz de gerar volume relevante de produtos, empregos e receitas para o setor público e privado, além de ter potencial para dinamizar o setor florestal em escala local, regional e nacional".

de Ecossistemas e Biodiversidade, which provides low-cost financing for restoring areas in Brazilian biomes and for ecosystem recovery and conservation (BNDES, [202-]). Expanding financial resources within the system will foster the growth of forest concessions. Debt and capital markets can further encourage resource mobilization through specific credit instruments, such as the existing Rural Product Certificate (CPR) and Agribusiness Receivables Certificate (CRA).

The framework of forest concessions can provide benefits not only in terms of reducing illegal deforestation but also in controlling land occupation in the Amazon region, combating land grabbing, and enabling the effective implemen- tation of the Rural Environmental Registry, as provided in Article 29 of Law No. 12,651/2012 (Forest Code) (Brasil, 2012). Moreover, "another benefit of forest concessions is the generation of direct jobs, thereby fostering social and economic improvements for the local population"[13](Rodrigues et al., 2020, p. 1306, free translation). They directly affect the material conditions of existence and the feed- back processes of communities within a framework that integrates ecological pro- tection into the socioeconomic and cultural equation.

Environmental protection management through forest concessions is situated among the economic instruments established in Article 9, XIII, of Law No. 6,938/1981, the National Environmental Policy Law (Brasil, 1981). Importantly, the applied dimension of stimulating changes in the matrix of production factors, encouraging or discouraging conduct, is not exclusive to Brazil. The World Bank also promotes sustainable management initiatives and financing, which obviously require coordinated and well-planned implementation to avoid misuse (Gray, 2002), a concern critically noted by the United Nations (FAO, 2018).

One of the main risks lies in the co-optation of the system by predatory and exclusionary practices, whereby exploitative activities undergo only superficial changes, and the system is instead manipulated to exclude local populations, such as traditional and Indigenous communities (Cavalcante Júnior, 2023). For this reason, the UN-FAO articulates guiding principles for the design and imple- mentation of forest concessions. Among these, Principle 7 emphasizes the need for community participation and benefit-sharing among locally and regionally af- fected communities (FAO, 2018). Once again,

[13] In the original: "outro benefício das concessões florestais é a geração de empregos diretos, promovendo, assim, melhorias sociais e econômicas para a população local".

the framework of cultural materialism proves relevant: altering the basis of social organization or legal frameworks without a communicative interface connected to infrastructure fails to deliver the expected ethical values, which remain unstable at the superstructural level.

Therefore, the establishment of advanced and critical governance (Monkel- baan, 2019) is essential to prevent poorly executed concession programs from undermining or damaging the institution's potential. This ensures that critical analyses properly distinguish between the modular structure of the instrument and misguided or harmful applications. Since the correlations of interaction within material, technological, environmental, and distributive disputes involve communities, the implications for entrepreneurs and stakeholders (Monkelbaan, 2019) must be adequately assessed. Without this, the link between infrastructure, struc- ture, and superstructure may break down, leading to failures and compromised effectiveness. This reflects the direct application of the organizational principles of the Environmental Rule of Law. It is "grounded in environmental dogmatics— limited and legitimized by the prevailing culture, within a framework of feasible sustainability—but which, on the other hand, recognizes that such a parameter is subject to reassessment and reaffirmation, as enabled by zetetics"[14] (Cirne, 2018, p. 72, free translation).

The study by Instituto Escolhas (2023), which focuses on the inclusion of local communities in the concession process, highlights this factor as strengthening the efficiency and potential success of concessions. Its conclusions stress the need to establish networks of dialogue with existing levels and patterns of social and relational organization, considering that:

> […] at times, fear of strain and local conflicts with communities engaged in forest activities, who lack clear knowledge of how forest concessions operate, may hinder, or even prevent the launch and expansion of concession tenders[15](Instituto Escol- has, 2023, p. 93, free translation).

[14] In the original: ""pautado na dogmática ambiental – limitada e legitimada pela cultura presente, dentro de um valor de sustentabilidade possível – mas, de outro lado, reconhecer que este parâmetro é passível de reavaliações e reafirmações, viáveis pela zetética".

[15] In the original: "[…] por vezes, o receio de desgaste e de conflitos locais com comunidades que exploram atividades florestais e não possuem o claro conhecimento acerca da forma como as concessões florestais são operadas, podem prejudicar e até mesmo inviabilizar o lançamento e crescimento do número de editais de concessão".

In this regard, Chules, Scardua, and Martins (2018) argue for the potential of forest concessions to reduce illegal deforestation, as they combine the legal framework with the transformative basis of profit expectations embedded in production relations. Enabling regular timber, biotechnology, and forest resource exploitation as activities that yield greater economic value in use than the illegal conversion of forests into farmland is an essential point for effective environmental protection[16]. Thus, such protection depends on decisive action upon the infrastructural matrices that sustain the cultural productive model. Accordingly, reducing deforestation in concession areas is a central point in arguments favoring the strengthening of forest concessions (Chules; Scardua; Martins, 2018).

Although this understanding has been supported by data for over a decade (Araújo et al., 2017), concessions remain timid, both in their availability and in demand. A notable example is the Altamira National Forest, created in 1998 under federal management, where the forest concession, combined with the presence of a management council and a management plan, resulted in reduced deforestation (Araújo et al., 2017). Beyond its impacts on timber and biotechnology resource management, forest concession management is a direct factor in climate impact assessments because of its influence on deforestation.

A study by Lopes, Cozendey, and Chiavari (2024) analyzes public concessions and other models of partnerships between the state and private entities for the efficient management of environmental protection through the lens of economic instruments. The authors highlight the possibility of transferring carbon credit ownership to concessionaires, a factor that enhances the economic value and applied technological dimension of forest concessions (Lopes; Cozendey; Chiavari, 2024). The possibility of the concession contract granting concessionaires ownership of carbon credits during the concession period, along with the right to commercialize certificates representing such credits and associated environmental services, directly affects the material conditions of infrastructure.

Consolidating forest concessions in their potential to satisfy needs through the legal framework implies effects on the formation and articulation of material production and technology factors, from which organizational patterns unfold and legal frameworks

[16] A relevant approach to this point is provided in Pegoraro and Dalmas (2025).

are reinforced. As Hawken, Lovins, and Lovins (1999) argue, it is possible, from this perspective, to link the potential of forest concessions to the reformulation of material conditions, including relations with natural resources, technology, and the economic system, along with the rise of new industrialization models.

5 FINAL CONSIDERATIONS

Understanding the legal framework of public forest management, and consequently the concession of public forests, requires a paradigmatic structure that allows reflection not only from a legal standpoint but also on an interdisciplinary scale. Much of the construction and implementation of legal institutions relies excessively on perspectives tied to idealism. Such perspectives separate the material conditions of existence in a society, including technological contexts, natural resources, economic systems, social organizations, and the legal order, as well as the formulation and application of ethical guidelines and value-based spheres.

The counterpoint to this line of interpretation is made possible through the application of cultural materialism as a way of understanding social, political, economic, and legal configurations and arrangements. This application enables critical readings and analyses that combine diverse but interconnected aspects, categorized by Marvin Harris in the concepts of infrastructure, structure, and superstructure. Effective environmental protection is contingent upon an integrated approach that enables the concrete realization of legal frameworks. This approach must be based on the material conditions and the configurations of production factors connected to the existence and sustainability of the communities and individuals involved.

Understanding and implementing legal frameworks through the lens of cultural materialism implies the need to provide mechanisms and material factors that dismantle the very autopoiesis of predatory destruction. This autopoiesis stems from a destructive model that constitutes the foundational reason for disregarding social organizations and normative frameworks that proclaim ecological protection in value-based terms. Normative effectiveness cannot be expected when supported by idealist mechanisms, much less through strategies centered on ecological romanticism that seek to protect environmental goods based on moral or axiological expectations detached from material conditions of existence.

When the regulatory framework for forest concessions is implemented with a methodological understanding that articulates infrastructure, structure, and uperstructure, it allows for the use of implementation strategies, instruments, and tools that ensure the effectiveness of a sustainable exploratory model. In this way, ecological protection can be internalized as a favorable, apt, and appropriate pathway for sustaining collective existence and the material foundations of society. The low level of diffusion of the forest concession system can be credited to the weak internalization of its supporting elements in the material conditions experienced by collectivities still immersed in a cultural framework resistant to the use of natural resources, technology, and economic systems to protect environmental goods. Emphasizing a model based on the articulation among infrastructure, structure, and superstructure, with interdisciplinary economic, legal, social, and theoretical mechanisms, makes it possible to alter patterns of forest resource use. This includes the ecosystem services associated with them, such as biotechnology and carbon credits. The coordination of these mechanisms proves to be a promising pathway for reducing deforestation and mitigating the negative impacts of environmental problems on both micro and macro scales, including those related to climate change.

However, caution is required to ensure that the implementation of the model and its proposition of sustainable exploitation are not co-opted by marginal channels of predatory exploitation. Such co-optation could become a source of social exclusion and exacerbate distributive and recognition crises, affecting local and regional communities, whether Indigenous, traditional, or otherwise. Thus, it is essential to maintain a critical and proactive analysis centered on lived experiences that avoids idealized or romanticized platforms and preconceptions.

Forest concessions, when implemented within a redistributive and recognition-based framework grounded in material conditions and a critique of social organizations offer a decisive alternative for addressing the contemporary envi- ronmental crisis. Strengthening subsistence mechanisms and economic incentives for these concessions (particularly financial ones), while also making illegal exploitation more difficult and costly through robust public oversight, provides an effective pathway to promote productive patterns conducive to sustainability and structurally overcome predatory practices.

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Authors' Contribution

Both authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA):

Thomé, R., & Kokke, M. (2025). CULTURAL MATERIALISM AND FOREST MANAGEMENT. Veredas Do Direito, 22(1), e222987. https://doi.org/10.18623/rvd.v22.2987