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SOCIO-ECONOMIC IMPACTS OF ENVIRONMENTAL LAW IN BRAZIL

IMPACTOS SOCIOECONÔMICOS DO DIREITO AMBIENTAL NO BRASIL

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Abstract
Based on an analysis of specific themes, this article seeks to portray some of the relevant socio-economic impacts caused by Environmental Law in Brazil. To this end, the discipline of Environmental Law and its instruments of implementation are initially delimited, defining the five phases of the subject. The social impacts due to the constitutionalization of the right to an ecologically balanced environment and the instruments aimed at developing basic infrastructure in Brazil are then explored. In particular, issues such as the constitutional right to an ecologically balanced environment in the 1988 Federal Constitution and the impact of Environmental Law on basic infrastructure in Brazil are discussed.

Resumo
Com base em análise de temas específicos, este artigo busca retratar alguns dos impactos socioeconômicos relevantes ocasionados pelo Direito Ambiental no Brasil. Para isso, faz-se inicialmente uma delimitação da disciplina Direito Ambiental e de seus instrumentos de efetivação, retratando as cinco fases da matéria. Em seguida, exploram-se os impactos sociais decorrentes da constitucionalização do direito ao meio ambiente ecologicamente equilibrado e dos instrumentos voltados ao desenvolvimento da infraestrutura básica no Brasil. Em especial, retratam-se questões como a previsão do direito constitucional ao meio ambiente ecologicamente equilibrado na Constituição Federal de 1988 e o impacto do Direito Ambiental na infraestrutura básica

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With regard to economic impacts, the costs of environmental protection, the transformation of natural resources into economic assets and changes in the consumption model are examined. This article uses an analysis of norms and instruments, as well as official and market data, to conclude that Environmental Law plays an important role in promoting positive impacts on society, the economy and the environment.
Keywords: economic assets; Environmental Law; economic impacts; social impacts; infrastructure.

no Brasil. Com relação aos impactos econômicos, examinam-se os custos da proteção do meio ambiente, a transformação dos recursos naturais em ativos econômicos e as mudanças no modelo de consumo. Este artigo se vale da análise de normas e instrumentos, bem como de dados oficiais e mercadológicos, para concluir que o Direito Ambiental tem protagonismo na promoção de impactos positivos na sociedade, na economia e no meio ambiente.
Palavras-chave: *ativos econômicos; Direito Ambiental; impactos econômicos; impactos sociais; infraestrutura.*

Introduction

Over the past five centuries, profound social changes have swept the globe. The Industrial Revolution, the technological boom, and population growth have significantly transformed human-environment interactions. Natural resources have been exploited at unprecedented levels, leading to severe environmental changes and prompting concerns on the sustainability of these practices.

Environmental Law emerged in this context as a legal science dedicated to preserving an ecologically balanced environment by regulating human activities that actually or potentially impact nature. Despite its importance in ensuring conditions suitable for human subsistence, Environmental Law in Brazil only began to gain attention in the 1970s. The following two decades brought significant advancements, particularly with the development of regulatory instruments for environmental management and protection. However, from the year 2000 onward, amid the intensifying degradation of natural resources, the field gained heightened prominence.

Consequently, Brazil's current legal framework encompasses both substantive and procedural sources that address a broad spectrum of environmental issues, enhanced by various regulatory instruments to increase their effectiveness. This preservation-oriented regulatory approach has had substantial socioeconomic impacts in Brazil, especially given the close interdependence between environmental and socioeconomic factors.

It is worth noting that since 1972, the United Nations (UN) has increasingly linked development to social and economic aspects. This connection was evident at the 1972 Stockholm Conference with Principles 8 and 9; at Rio 1992, where

the term "development" was included in the very title of the United Nations Conference on Environment and Development; at the 2002 Johannesburg Summit, which led to the Johannesburg Declaration on Sustainable Development; at Rio+20, which explicitly reaffirmed support for development and environmental protection; and finally, in 2015, with the Sustainable Development Goals (SDGs), in which five out of the 17 goals explicitly referenced sustainable development.

In this context, any measure, instrument, or solution aimed at environmental protection must consider the associated economic and social factors. By examining examples highlighted throughout this study, the goal is to demonstrate how Environmental Law has responded—or attempted to respond—to significant socio-environmental challenges and to evaluate the societal and economic impacts of these efforts. This analysis is premised on the presence of an existing or imminent socio-environmental issue, upon which Environmental Law establishes protective mechanisms that, in turn, yield positive outcomes.

Clearly, the examples discussed in this article are illustrative rather than exhaustive. Social and economic systems are affected by Environmental Law in countless ways, making it impossible to capture the full complexity of these interactions. Here, the aim is simply to highlight some of the most significant impacts that modern society has experienced as a result of Environmental Law's protective measures.

Additionally, this study aims to demonstrate that, despite concerted efforts by the legal system to preserve the environment, existing solutions remain inadequate. While numerous instruments and regulations have been developed over recent decades to promote environmental protection, issues such as inadequate green urban infrastructure, greenwashing, deforestation, reliance on fossil fuels, and pollution are as prevalent today—if not more so—than they were 50 years ago. Thus, although progress has been achieved through legal mechanisms for protection and enforcement, a comprehensive solution to current socio-economic and environmental challenges remains out of reach.

1 Environmental law in the Brazilian legal system

The analysis of cause-and-effect relationships between two elements can only be conducted by first defining the objects involved. This is a basic premise of analytical science, which requires clear delineation of elements to make precise correlations. In the context of this article, evaluating the social and economic impacts of Environmental Law in Brazil hinges on a comprehensive understanding

of what Environmental Law entails. This task is not straightforward, given the wide range of issues the field aims to address.

Since the mid-20th century, Environmental Law has been in a race to confront a range of environmental challenges. This race is dynamic and complex—a race against time that, in the name of environmental preservation (and, indeed, the survival of humanity), must navigate competing interests, differing ideologies, deeply ingrained cultural and social issues, limited resources, and numerous other obstacles.

Despite the progress made in the environmental field to date, the future remains challenging. There are historical issues that persist unresolved, whether due to insufficient legal frameworks, resource shortages, or inefficiencies in the implementation and management of available tools. Meanwhile, human interaction with the environment continuously generates new challenges, such as those related to the exploitation of new energy sources.

The complexity of these issues results in an equally complex legal system, comprised of an extensive set of rules and instruments aimed at regulating human activities and protecting the environment. Brazil's positivist legal system, with its normative primacy, is further supported by a robust body of legal doctrine and an active judiciary that frequently addresses environmental cases. Given the breadth of the Brazilian legal system and the expansiveness of its (uncodified) environmental legislation, it is crucial to clearly delineate the scope of Environmental Law in order to effectively advance the proposed analysis in this study.

1.1 The essence of Environmental Law

Generally, Law functions as a regulatory framework for human activities, crafted by society to govern individual and collective behavior, structuring relationships and agreements within the social fabric. While this principle applies to Environmental Law, it also introduces a critical protective dimension: the relationship between society and the environment.

In the absence of human intervention, the environment regulates itself through physical, chemical, and biological processes, operating within an inherent dynamic that can be observed both in stable cycles and in extreme natural events like historical patterns of global warming and cooling. However, modern human activity—driven by a logic of resource extraction and accumulation, which has intensified significantly over the past century—has accelerated the occurrence of such environmental shifts. This acceleration requires a legal framework specifically

aimed at environmental protection.

Environmental Law has developed as a branch of legal science in response to the need for regulating human activities that impact the environment, whether directly or indirectly. Its primary objective is to preserve the environment within established standards, ensuring sustainability for present and future generations (Farias, 2009).

According to Coelho (1975, p. 5, free translation), Environmental Law is defined as "[…] a system of legal norms that imposes limitations on property rights and the economic exploitation of natural resources. Thus, it aims to preserve the environment to improve the quality of human life"[1].

The characterization of Environmental Law stems from the intrinsic symbiosis among the environment, economy, and society, which are closely interconnected in an interdependent cycle. Notably, irrespective of value judgments regarding the prevailing economic system, there is a doctrinal consensus on the centrality of these three elements within Environmental Law as it operates in modern social structures. Even perspectives advocating for economic degrowth in response to ecological risks (Wienke, 2023) or critiquing the practice of assigning economic value to the environment are grounded in the interplay between economy, society, and the environment. While acknowledging the theoretical debate surrounding the current economic system is important, this article aims solely to analyze how Environmental Law has generated social and economic outcomes in Brazil.

To illustrate the interconnectedness of these three elements, consider the example of a city lacking an adequate sewage system. Such a deficiency leads to public health crises and environmental pollution while requiring significant financial resources to address. Consequently, enacting a law to establish a universal framework for sanitation and water supply services in Brazil serves to protect both the environment and public well-being, while simultaneously triggering economic impacts.

In addition to these three pillars, the complexity of Environmental Law also stems from its interdisciplinary nature. Preserving biodiversity, for instance, requires contributions not only from the legal field but also from disciplines such as Biology, Geography, Oceanography, and Environmental Engineering. Environmental Law stands out as the legal discipline with the most extensive interconnections with other fields of knowledge.

1 From the original: "[…] um sistema de normas jurídicas que, estabelecendo limitações ao direito de propriedade e ao direito de exploração econômica dos recursos da natureza, objetivam a preservação do meio ambiente com vistas à melhor qualidade da vida humana".

Given its inherent complexity, Environmental Law derives its foundations from both formal and material sources. Formal sources include the Federal Constitution, statutes, case law, international treaties and declarations, while material sources encompass scientific discoveries, legal doctrine, and social movements (Farias, 2020). To ensure the efficacy of legal norms, these sources must account for intricate natural processes, which are comprehensible only through thorough technical and scientific study.

Brazil's formal environmental legal framework can be traced back to its colonial history, with the Brazilwood Ordinance of 1605 (Meira, 2008), which required royal authorization for the harvesting of this valuable species. However, the establishment of a comprehensive and cohesive environmental legal system only began in the latter half of the 20th century. Key legislative milestones in this period include the Forest Code of 1965 (Law No. 4611/1965) and the National Environmental Policy Act of 1981 (Law No. 6938/1981).

These foundational regulations were instrumental in the 1988 Federal Constitution's recognition of the environment as a diffuse fundamental right. This constitutional milestone catalyzed the creation of a fine array of environmental laws spanning various legal categories. From constitutional mandates to detailed resolutions and ordinances that define environmental quality standards, Brazil developed a highly regulated, sophisticated environmental legal system, positioning its Environmental Law as one of the globally most advanced.

1.2 Instruments for implementing Environmental Law

To ensure the effectiveness of environmental protection, Environmental Law relies on a comprehensive framework of incentives and responsibilities. This system is not static; it has evolved through distinct phases over time, resulting in what Ferrer (2002) identifies as the five phases of Environmental Law.

In the first phase, Environmental Law was grounded in the concept of "non-doing", emphasizing prohibitions and sanctions as a repressive mechanism to prevent activities with tangible environmental impacts. This repressive system established a duty of compliance for individuals, corporations, and public authorities, enforced through civil, administrative, and criminal liability. The principle of shared responsibility supported this phase, holding all parties accountable for actions impacting the environment.

The second phase introduced the principles of precaution and prevention, which became foundational to modern environmental governance. The notion

of prevention laid the groundwork for one of the most important tools for environmental protection: environmental licensing. Beyond traditional instruments, these principles constituted the basis for the implementation of new environmental protection mechanisms, such as environmental compliance programs.

The third phase of Environmental Law is marked by increased public participation in environmental issues. Given that environmental protection is a diffuse fundamental right explicitly stated in the Brazilian Federal Constitution, environmental matters are both a right and a duty shared by all. Consequently, a range of participatory instruments has been implemented, such as initiatives for environmental education, requirements for public disclosure of information, public hearings, and mechanisms for public involvement in deliberative bodies.

Beyond established legal norms, environmental issues began to be addressed internally within the business sector, marking the fourth phase of Environmental Law. Leveraging market techniques and cost internalization, Environmental Law started to be considered in business contexts both from a risk perspective (operational, legal, financial, reputational) and as a source of new opportunities, especially given the economic value attributed to the environment (eco-labeling, green businesses, and so forth). This fourth phase is seen as a true paradigm shift in the corporate sector, which began to integrate environmental considerations into all stages, from supplier network selection to meeting consumer expectations.

Finally, the fifth phase of Environmental Law is characterized by a comprehensive regulatory system. Instruments such as reverse logistics, for example, have introduced a chain-wide responsibility for environmental issues. Consequently, all involved parties—from industries to consumers—are now accountable for the disposal of consumed goods and overall environmental protection.

These elements reveal that, despite being a relatively new field in Brazil's legal system, Environmental Law has undergone constant and significant evolution. Addressing historical problems and the new challenges posed by human-environment interactions requires Environmental Law to remain under continuous review and update, enabling it to implement new mechanisms better aligned with contemporary realities.

Based on the foregoing, Environmental Law can be understood as a discipline dedicated to regulating human activities that impact the environment, utilizing various mechanisms for implementation. The following section analyzes the social and economic impacts arising from the implementation of these instruments within the Brazilian legal system.

2 Social impacts of Environmental Law

The recognition of the social dimension as an intrinsic element of Environmental Law is rooted in the inseparable connection between humanity and the environment. While humans have occasionally sought to isolate themselves from nature—retreating into apartments with small windows—they ultimately remain dependent on their surroundings for survival. This principle is emphasized in *Chief Seattle's Letter* (Perry, 2007), cited as an epigraph in the renowned work *The Web of Life* (Capra, 2012, p. 3): "Whatever befalls the earth, befalls the sons and daughters of the earth. Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself".

Guided by traditional knowledge, humanity maintained a predominantly sustainable relationship with the environment for much of its history, rooted in a subsistence-based model of hunting and gathering. By the mid-sixteenth century, however, this paradigm shifted to one of surplus accumulation, fundamentally transforming human interaction with natural resources. This social reorganization, driven by an accumulation-based logic, introduced profound and complex changes in the exploitation of natural resources.

Alongside shifts in consumption, life expectancy increased significantly, fueling an unprecedented population boom. In the twentieth century alone, the global population surged nearly fourfold, from approximately 1.5 billion in 1900 to 6 billion by the year 2000. For the twenty-first century, UN projections estimate that the global population will grow from 7.8 billion in 2022 to 9.7 billion by 2050, potentially stabilizing only in the latter half of the century (Population…, 2024). While population growth undeniably amplifies natural resource consumption, this critical factor remains conspicuously underexplored in specialized legal scholarship, as if an unspoken agreement of convenience exists among interested parties.

This shift has profoundly transformed the methods and scale of natural resource use, giving rise to severe social challenges, including the violation of traditional peoples' rights, forcing some populations into precarious living conditions without access to clean water or sanitation, the creation of climate refugees, an increase in disaster victims, and the intensification of environmental racism.

The emergence of today's socio-environmental framework, marked by acute risks to the natural environment, has rendered the protections afforded by Environmental Law indispensable. This legal science, dedicated to regulating human interactions with the environment, seeks to ensure humanity's survival, both for

present and future generations. Beyond mere survival, Environmental Law strives to safeguard a balanced environment that enables populations to enjoy a dignified, stable, and healthy quality of life.

The following examples illustrate the essential role of Environmental Law in addressing critical socio-environmental issues and the societal benefits stemming from these protections. Each example begins with the identification of a socio-environmental problem, followed by an overview of the protective frameworks established by Environmental Law to address it, and the resulting positive social outcomes. While numerous serious challenges persist within the socio-environmental realm, these examples underscore significant social progress achieved through Environmental Law in Brazil over recent decades.

2.1 The constitutional right to an ecologically balanced environment

Currently, many countries are engaged in internal struggles to constitutionalize Environmental Law. Brazil however, incorporated environmental protection into a dedicated chapter of its 1988 Federal Constitution, which doctrine recognizes as a fundamental right.

The main clause of Article 225 reflects the anthropocentric perspective of the constitutional text by establishing that everyone has the right to an ecologically balanced environment, which is a common good essential to a healthy quality of life, placing on the government and society the duty to defend and preserve the environment for present and future generations (Brasil, 1988). Based on this premise, the Brazilian Federal Constitution outlined mechanisms for protection: protected territorial spaces, prior studies for potentially degrading works or activities, control of activities with potential risk to life, and protection of ecological functions. All of them ensure the ecological balance necessary for human survival.

This constitutional provision is crucial as it requires that all infra-constitutional norms be enacted and applied in light of the fundamental right to an ecologically balanced environment. Thus, the Brazilian Federal Constitution safeguards both individual rights, such as the rights to life and security, and social rights, including the right to health, thereby benefiting individuals and society as a whole. As Milaré (2005, p. 137, free translation) observes:

> The recognition of the right to a healthy environment truly constitutes an extension of the right to life, whether from the perspective of human beings' physical existence and health or from the standpoint of the dignity of that existence – the quality of life – which makes life worth living[2].

2 From the original: "O reconhecimento do direito a um meio ambiente sadio configura-se, na

It was following the 1988 constitutional provision for environmental protection, with its allocation of legislative competencies on the subject, that the Brazilian legal system saw a substantial expansion of Environmental Law norms. Consequently, numerous laws were enacted, including: the Pesticides Law (Law No. 7802/1989); the National System of Nature Conservation Units (Law No. 9985/2000); the Agricultural Policy (Law No. 8171/1991); the National Water Resources Policy (Law No. 9433/1997); Environmental Crimes and Violations (Law No. 9605/1998); the Atlantic Forest Law (Law No. 11428/2006); the National Solid Waste Policy (Law No. 12305/2010); and the New Forest Code (Law No. 12651/2012).

In addition, there are numerous regulations covering specific topics, particularly ordinances and resolutions issued by environmental oversight and protection agencies such as the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) and the National Environmental Council (CONAMA).

The constitutionalization of the right to an ecologically balanced environment has led to the protection of air and water quality, food safety, pollution control, climate change mitigation, and the preservation of territorial spaces. It also encompasses measures for fire prevention, species conservation, natural resource protection, combating the spread of diseases, and safeguarding urban environments and cultural heritage. In essence, by embedding environmental protection within its Constitution, Brazil has guaranteed the establishment of vital norms to the well-being and survival of its population.

2.2 Impact on Brazil's basic infrastructure

According to data from the Ministry of Integration and Regional Development (MIDR), approximately 36 million people in Brazil still lacked access to water supply services as of 2021 (Brasil, 2023b). In the same year, 96 million individuals, or 44.2% of the Brazilian population, had no access to sanitation services (Brasil, 2023c). Similar deficiencies were evident in other sectors, such as solid waste management, in which only 89.9% of the population had access to waste collection services (Brasil, 2023d), and housing, with a deficit of 5.8 million housing units reported in 2019 (Dados…, 2021).

These gaps in basic infrastructure have far-reaching consequences, resulting

verdade, como extensão do direito à vida, quer sob o enfoque da própria existência física e saúde dos seres humanos, quer quanto ao aspecto da dignidade desta existência – a qualidade de vida –, que faz com que valha a pena viver".

in undignified living conditions for a significant portion of the population. Moreover, they exacerbate environmental problems, including pollution, soil and water contamination, public health crises, and overall environmental degradation.

This dire situation frequently reaches the judiciary, as evidenced in Public Civil Action No. 0801265-48.2014.4.05.8500 (Brasil, 2017), initiated by the Federal Public Prosecutor's Office against the Companhia de Saneamento de Sergipe (DESO). The action sought to compel the company to supply two water trucks per week to the inhabitants of the Quilombola Community of Pontal da Barra, located in the municipality of Barra dos Coqueiros, state of Sergipe, until water service in the village could be fully regularized. The court ruled in favor of the plaintiffs and the decision was upheld on appeal. Similar legal actions have become common throughout Brazil as citizens attempt to secure their rights to health, dignity, and adequate living conditions.

Beyond these temporary measures, the National Congress enacted Law No. 14026/2020, known as the New Sanitation Framework (Brasil, 2020), in July 2020. This law set ambitious goals for universal access to sanitation and water supply by December 31, 2033. According to Article 11-B, contracts for the provision of basic sanitation services must include universal access targets, aiming to provide 99% of the population with potable water and 90% with sewage collection and treatment by December 31, 2033. Additionally, the law mandates goals for service continuity, reduction of water losses, and improvement in treatment processes.

Given the importance of the sector, Law No. 14026/2020 prioritized environmental licensing for sanitation activities, to be governed by specific regulations. These regulations will also set forth simplified licensing procedures for low-impact environmental activities, considering the scale of facilities, anticipated environmental impacts, and the resilience of implementation areas.

To achieve the universalization goals for sanitation services, KPMG released a study in 2020 estimating that investments of R$ 753 billion would be needed by 2033 (KPMG, 2020). ABCON SINDCON updated this figure to R$ 893 billion as of August 2022, accounting for investments made in the interim (Atualização…, 2022).

Conversely, a study published by the Instituto Trata Brasil in November 2022 estimated that achieving universal access to basic sanitation could generate over R$1.4 trillion in socioeconomic benefits for Brazil over 20 years. These benefits would include reduced healthcare costs, increased labor productivity, higher real estate values, and enhanced tourism revenue. Additionally, the study highlighted significant environmental gains:

> Perpetuity can be understood as the wealth and well-being that the country will continually gain from the advancement of sanitation, leading to a reduced incidence of disease, increased labor productivity—especially among young people who will have access to clean water and sewage collection and treatment from birth—and environmental enhancement[3] (Universalização…, 2022, p. 5, free translation).

In this regard, the imposition of universal sanitation service targets, through administrative and environmental regulations, serves to accelerate investments in the infrastructure sector. At the same time, this measure significantly strengthens the guarantee of individual and collective rights, as well as providing benefits to the environment.

Although significant challenges remain, it is clear that effective regulation, the adoption of appropriate policy instruments, and adequate investment can mitigate negative social impacts and promote the sustainable use of natural resources for the benefit of all. In this context, Environmental Law has served as a crucial mechanism for protecting not only the environment but also fundamental rights such as life, security, and health.

3 Economic impacts

In addition to social impacts, Environmental Law also has significant economic implications. However, much like social factors, economic drivers do not stem solely from choices made within Environmental Law but are often the very reasons it is needed. Given that Environmental Law exists to impose limits on human activities, it is only natural that environmental regulations are designed as restrictions on the use of environmental resources, particularly within an inherently market-oriented structure.

This economic preservation logic applies not only to business activities but also to all entities within Public and Private Law. For all stakeholders, it is essential that interactions are guided by sustainable development principles, incorporating environmental, social, and economic factors.

Sustainable development means ensuring that the current use of natural resources does not endanger the survival of future generations. This requires the reasonable use of resources to foster the country's socioeconomic growth without leading to resource depletion and societal collapse. As Farias (2019, free

3 From the original: "A perpetuidade pode ser vista como o ganho de riqueza e de bem-estar que o país terá para todo o sempre com o avanço do saneamento, cujas consequências serão a redução da incidência de doenças, o aumento da produtividade do trabalho, principalmente dos jovens que já nascerão com acesso à água tratada e à coleta e tratamento do esgoto, e a valorização ambiental".

translation) notes, "the only way out of the environmental crisis is through the economy, which must be reconsidered and redesigned with the environment and its complex relationships in mind"[4].

Thus, economic activities within the Brazilian territory must necessarily consider environmental protection, a requirement rooted in the Brazilian Constitution. Article 170, item VI, established that the economic order must aim to ensure a dignified existence for all, in line with social justice principles, and must observe the principle of environmental protection (Brasil, 1988).

The following examples illustrate how Environmental Law has had significant economic impacts in Brazil. Notably, environmental preservation incurs considerable costs, which has led to the development of economic models focused on monetizing environmental resources and services. This approach aims not only to generate wealth but also to make preservation itself feasible. Finally, we will explore how this new economic paradigm has transformed consumption patterns within society, underscoring the economic impact of Environmental Law in Brazil.

3.1 The cost of environmental protection

The Brazilian Federal Constitution mandates environmental preservation as a duty of both the public authorities and society at large. From this perspective, everyone is subject, within the scope of their responsibilities, to the defense of the environment. This duty includes both the relinquishment of certain uses of natural resources under their ownership, as stipulated by law, and the expenditure of financial resources for environmental preservation.

Paragraph 1 of Article 225 of the Brazilian Federal Constitution assigns a broad range of duties to the Public Authority, including the responsibility to preserve and restore essential ecological processes, ensure the ecological management of species and ecosystems, regulate the production, commercialization, and use of techniques, methods, and substances that pose risks to life, quality of life, and the environment, promote environmental education, and protect wildlife and flora, among others. Law No. 6938/1981, regulated by Decree No. 99274/1990 (Brasil, 1990a), further established the duty of the public sector to maintain ongoing oversight of environmental resources, aiming to balance economic development with environmental protection and ecological stability.

4 From the original: "a única porta de saída para a crise ambiental é a economia, que deve ser rediscutida e redesenhada no intuito de levar em consideração o meio ambiente e suas complexas relações".

These responsibilities, especially environmental monitoring, require a significant allocation of human and financial resources. This underscores the substantial costs involved in environmental protection.

The Classification of the Functions of Government (COFOG) is a metric established by both the Organization for Economic Cooperation and Development (OECD) and the UN to categorize government functions and socio-economic objectives. According to it, the Brazilian government's spending on environmental protection was R$ 3.8 billion in 2021 and R$ 4.05 billion in 2022, representing 0.04% of the Brazilian GDP in both cases (Brasil, 2023a). This spending percentage was significantly lower than in 2019 and 2020, when it accounted for 0.07% of the national GDP (R$ 5.2 billion in 2019 and R$ 4.9 billion in 2020). Additionally, although relatively high, environmental protection spending was the lowest among the analyzed areas (such as defense, general public services, health, education, and others), ranking just slightly above expenditures on leisure, culture, and religion in 2021 and 2022.

Environmental protection expenditures encompass salaries, social contributions, goods and services usage, transfers and donations, gross investments, interest, subsidies, and social benefits. These expenses encompass areas such as waste management, wastewater management, pollution reduction, biodiversity and landscape protection, environmental protection research and development, and general environmental protection.

Despite these expenditures, the issue of public spending—or lack thereof—is frequently addressed by the Judiciary. In 2022, the Federal Supreme Court (STF) ruled on Direct Action for Unconstitutionality by Omission (ADO) No. 59, filed by the Brazilian Socialist Party (PSB) and others against the Union. The ADO argued that the Union had failed to allocate approximately R$ 1.5 billion in funds for the Amazon Fund and the National Climate Change Fund (Climate Fund), as mandated by law for financing preservation projects in the Amazon. In a final decision, the Court, by a majority, partially upheld the action, ordering the Federal Union to take the necessary administrative steps to reactivate the Amazon Fund within 60 days (Brasil, 2022), among other measures.

These examples demonstrate that environmental protection measures require not only an analysis of the best environmental technical standards but also effective budgetary planning.

In the private sector, the duty of environmental protection is reflected in two key ways: internalizing the costs of environmental protection and limiting the full exploitation of available natural resources.

Regarding the internalization of negative externalities on the environment, companies are expected to bear the costs of integrating environmental protection and management into their production processes. This principle is explained by Foyen (2016, p. 65, free translation):

> Even before economic agents experience the potential harms or benefits of production processes, nature bears the brunt in two ways. It provides the essential raw materials for final products, and it also absorbs the environmental fallout from pollution, which may not always be immediately visible or felt. These phenomena are known in microeconomics as externalities, either positive or negative[5].

Under the principle of internalizing negative environmental externalities, companies end up bearing the cost of environmental protection through the licensing of their activities. This involves various obligations, including conducting environmental impact studies, implementing environmental protection technologies such as air and water filters, funding mitigation or compensation measures, establishing monitoring and enforcement systems, investing in research and development, managing and properly disposing of waste, restoring degraded areas, and preserving native areas, among other responsibilities. If companies fail to fulfill these environmental obligations, they face the consequences of penalties, which range from direct costs such as fines and reparations to transaction costs, including legal fees.

Environmental preservation has thus become part of companies' risk assessment frameworks, categorized into various business risks: operational risk (such as project stoppages and license denials), legal risk (due to regulatory changes), financial risk (including the impact of fines and environmental accidents on cash flow, and difficulties in securing financing for companies with environmental restrictions), and reputational risk (such as damage to brand image resulting from environmental infractions or disasters).

Furthermore, the restriction on fully exploiting natural resources, an essential component of sustainable development, entails immobilizing resources and land assets. According to Freitas (2000, p. 127, free translation), this approach does not abolish property rights but imposes necessary restrictions:

5 From the original: "Antes mesmo dos agentes econômicos sofrerem com eventuais malefícios, ou benefícios, decorrentes dos processos de produção, a natureza é quem se coloca duplamente nessa linha de tiro. Enquanto dela se extrai a matéria-prima essencial à concretização do produto final, nela os efeitos subjacentes da poluição também são depositados, ainda que nem sempre sejam sentidos ou vistos. Esses fenômenos são o que a microeconomia chama de externalidades, positivas ou negativas".

> Radbruch's synthesis provides the justification for limiting property rights. This is the basis of an evolving doctrine that aligns property usage with its social function. It is not about abolishing property rights, as was done in socialist countries. For example, the 1977 Constitution of the Union of Soviet Socialist Republics declares in Article 11 that state property is the collective patrimony of the entire Soviet people and that land, subsoil resources, water, and forests are the exclusive property of the state. Rather, it is about imposing limits, restrictions, and conditions on property rights[6].

In 2019, the Brazilian Agricultural Research Corporation (Embrapa) conducted a study (Ferreira *et al.*, 2019) utilizing data from the Rural Environmental Registry to estimate the economic market value of land allocated for environmental preservation across Brazil's 558 microregions. According to the study, this valuation was calculated based on regional land prices and the average values associated with various agricultural sectors (including grains, rice, *caatinga*, coffee, sugarcane, *cerrado*, Amazon forest, transitional forest, planted forests, fruit crops, Atlantic Forest, horticulture, pasture, and diversified production). The study concluded with an estimate indicating over two trillion Brazilian *reais* immobilized in preservation – R$ 2,380,561,900,151.73. Embrapa itself clarified that the study's objective was not to question the allocation of land for native vegetation preservation but rather "to measure the extent to which farmers and the country invest in the environment by forgoing agricultural production on these lands"[7] (Preservação…, 2024, free translation).

Thus, the data highlights that natural resource preservation cannot be separated from economic and market considerations. Environmental protection comes with substantial costs, both in terms of direct expenditures on active preservation and the expenses associated with institutional frameworks for resource management, enforcement, and infrastructure investments. Additionally, there are costs tied to restrictions on the full exploitation of natural resources on both public and private lands.

It is emphasized that the purpose of this analysis is not to question the validity of the measures and instruments aimed at preserving the environment and

6 From the original: "É aí, na síntese de Radbruch, que se encontra a justificativa para o limite ao direito de propriedade. Daí o crescimento da doutrina, adequando o uso da propriedade à sua função social. Não se trata de abolir o direito de propriedade, como feito em países socialistas. Por exemplo, a Constituição de União das Repúblicas Socialistas Soviéticas, de 7.10.1977, estabelece no art. 11 que a propriedade do Estado é patrimônio comum de todo o povo soviético e que são propriedade exclusiva do Estado a terra, o subsolo, as águas e as florestas. Trata-se, isto sim, de impor limites, restrições, condições, ao direito de propriedade".

7 From the original: "mensurar o quanto os agricultores e o País investem no meio ambiente, ao abrir mão de utilizá-las para a produção agropecuária".

natural resources. These measures are essential for the management of resources to ensure a sustainable socio-environmental model to support current and future generations. This analysis underscores that, within the logic of the Brazilian economic system, it is essential to account for the costs—whether public or private—required for environmental protection. Ultimately, sufficient and appropriately allocated resources are necessary to effectively implement the laws and instruments established for this purpose.

3.2 The environment as an economic asset

The need to preserve natural resources, along with the significant costs involved in doing so, has ushered in a new economic perspective on environmental issues. Whereas environmental preservation was once viewed purely as a cost by both public and private sectors, it has now been incorporated into the market economy and, through various mechanisms and tools, has been elevated to a valuable economic asset.

This new vision has led to the creation of a wide range of products and mechanisms that assign economic value to environmental preservation. Current examples of this trend include payments for environmental services, the regulated carbon credit market, public park use concessions, legal reserve quotas, green financing, sustainability bonds, and specific funds directed toward Environment, Social, and Governance (ESG) criteria.

It is important to clarify that while these measures generate wealth for both public and private sectors, they primarily serve as mechanisms to ensure environmental preservation. Understanding that Brazil operates within an established capitalist system is essential to recognize that the assignment of economic value to the environment can foster interest and commitment across sectors in its preservation.

Regarding the relevance of environmental products, the significant financial activity surrounding green bonds initiated by major financial institutions has been noteworthy in recent years. For instance, BTG Pactual, one of Brazil's largest investment banks, was approached by second-generation investors seeking to link their funds to sustainable businesses. In 2020, the bank created an impact-oriented division to promote products and services that combine positive socio-environmental impact with substantial financial returns (Viri; Adachi, 2020).

Since establishing this division, the bank has offered clients funds dedicated to sustainable finance investments in emerging markets (green bonds, social

bonds, sustainable bonds, and sustainability-linked bonds); funds focused on investing in debentures labeled ESG (green, sustainable, social, and sustainability-linked); investment funds supporting sustainability-focused startups in Chile that contribute to the UN Sustainable Development Goals (SDGs); and a fund dedicated to acquiring degraded lands, restoring native vegetation on 50% of the land and sustainably managing FSC-certified commercial forests on the remaining 50% (BTG Pactual, 2023). As a result, in 2023, BTG Pactual reported raising R$ 6.7 billion through sustainable debenture issuances, R$ 4.4 billion in Debt Capital Markets (DCM) sustainable issuances, and R$ 8.2 billion in eligible credit portfolios for sustainable finance.

This example illustrates that the financial returns from green business operations are not limited to generating substantial profits. Rather, it reflects a trend among investors to enhance their investments by selecting options certified for sustainability. This movement serves as an important instrument of pressure on the business community, enforcing adaptation of their operations to best socio-environmental practices while promoting more sustainable business models, such as renewable energy sources.

However, the economic valuation of environmental resources is not limited to large corporations. Brazilian law has provided for small producers and landowners, ensuring that environmental preservation is profitable at all levels.

Payment for Environmental Services (PES), for instance, was institutionalized in Brazilian law through Law No. 14119/2021, establishing a financial mechanism to compensate rural producers, small farmers, family farms, and resettled communities. The program also aims to benefit traditional communities and indigenous peoples who provide environmental services and generate benefits for society (Brasil, 2021a). Resources for PES payments come from sources including private individuals, legal entities and international cooperation agencies.

Environmental services eligible for payment include maintenance, recovery and improvement of environmental conditions in areas such as provision (supply), support (maintenance), regulation (carbon sequestration, flood mitigation, process control), and cultural services (tourism, recreation, cultural identity, among others). Payment modalities include direct monetary or non-monetary payments, social improvements, certificates for emissions reductions from deforestation and degradation, loans, Environmental Reserve Quotas, and green bonds.

In Brazil, some major PES projects were initiated even before the enactment of the law. For example, the Mantiqueira Conservation Plan was implemented in 2016 to restore 1.5 million hectares of forest in the Serra da Mantiqueira region.

Another example is the Carbon Neutral Program from the Brazilian cosmetics company Natura (2022), in partnership with the Consortium and Densified Economic Reforestation Project (RECA). Both promote payment for environmental services within their production chain, purchasing raw materials, sharing benefits for traditional knowledge and genetic heritage, and supporting forest conservation. Thus, the lower the deforestation rate, the greater the financial return for rural producers providing these environmental services.

Some environmentalists criticize the monetization of natural resources, arguing for a principle of gratuity. However, initiatives like these demonstrate that embedding environmental issues within an economic logic can yield positive outcomes for preservation.

Transforming the environment into an economic asset enables society and the market to move beyond perceiving environmental preservation solely as a cost or business risk, instead recognizing it as a competitive advantage in protecting natural resources. This approach establishes a favorable framework for preservation within Brazil's existing capitalist system. By assigning economic value to environmental resources, it incentivizes preservation, making it more appealing than the exploitative use of resources.

3.3 Changes in the contracting and consumption model

Through consumer and contractual rules of an environmental nature, the legal field has taken on a leading role in promoting a more conscious and sustainable consumption model. An example of this is the creation of tools that allow consumers to assess the sustainability parameters of the products and services they purchase.

On this topic, Brazil's Consumer Protection Code (CDC) introduced several provisions addressing environmental aspects within consumer relations. Based on the principle that the National Consumer Relations Policy aims to uphold consumer dignity, health, and safety, the Consumer Protection Law (Brasil, 1990b) includes promoting environmental education among consumers as one of its guiding principles (Article 4, IX). In this context environmental education extends beyond campaigns and awareness initiatives; it also entails the obligation to provide individualized information on companies' activities and processes involved in the production and commercialization of goods.

In line with this approach, Articles 37, Paragraphs 1 and 2 of the CDC (Brasil, 1990b) prohibit any form of misleading or abusive advertising. This

includes advertising that discriminates, incites violence, exploits fear and superstition, takes advantage of children's lack of judgment and experience, disrespects environmental values, or is capable of leading consumers to behave in ways that are harmful or dangerous to their health or safety. Additionally, contract clauses related to the provision of products and services that violate or facilitate the breach of environmental regulations are deemed null and void (Article 51, XIV).

The duty to inform on environmental aspects, as imposed by consumer protection legislation, is crucial in raising public awareness on environmental impacts of consumption. Conscious consumption, then, is based on rational decision-making, in which consumers—aware of the environmental impacts associated with the production and supply chain—choose whether or not to purchase a product or service considering such impacts.

In response, companies have begun addressing consumer expectations regarding environmental criteria by implementing environmental performance metrics to assess both their internal management and environmental policies. They also assessed the policies of stakeholders involved in their operations. These measures are often encompassed under the ESG framework, which encourages companies to meet environmental, social, and governance standards through the establishment of an internal sustainability and responsible investment policy. Beyond drafting reports and implementing policies, it is essential for companies to disclose this information, ensuring transparency and accessibility for the benefit of consumers and enhancing their own corporate reputation.

In addition to private consumer relations, significant paradigm shifts have also emerged in public procurement concerning environmental preservation. The shift toward a public policy model that promotes sustainable consumption is evident in the environmental content introduced by Law No. 14133/2021—Brazil's new Public Procurement Law (Brasil, 2021b). Under this framework, public procurement is not only a means to acquire goods, products, and services but also a strategic tool for implementing environmental public policies.

The inclusion of sustainable national development as a goal in the Public Procurement Law reflects the legislator's choice—motivated by the urgency of environmental protection—to integrate sustainability objectives into the procurement process. To achieve this, the law grants a preference margin for recycled, recyclable, or biodegradable goods in public contracts and allows performance-based compensation linked to sustainability criteria. This approach not only encourages the selection of sustainable goods, products, and services but also signals to the

market the importance of producing goods that align with best environmental practices (Vita, Guimarães, & Breus, 2022).

This regulation is particularly relevant as it drives private companies interested in public contracts to adjust their practices to meet environmental criteria, placing them at an advantage over competitors. Moreover, beyond existing environmental regulations—such as environmental licensing and deforestation prohibitions—the incorporation of environmental criteria into public procurement provides additional motivation for companies to adopt best environmental practices.

These measures, applicable to both public and private spheres of consumption and procurement, illustrate how law, through normative initiatives, can effectively advance environmental preservation strategies and support the transition to a more conscientious and sustainable consumption model.

Final considerations

Environmental Law, as a regulatory framework guiding human activities to preserve the environment and natural resources, has played a critical role in addressing numerous socio-environmental challenges in Brazil. By drawing on both material and formal sources, it establishes protective structures capable of generating positive impacts. It is clear, therefore, that Environmental Law not only addresses ecological concerns but also has far-reaching social and economic implications.

On a societal level, the constitutionalization of the right to an ecologically balanced environment has paved the way for comprehensive environmental regulations spanning multiple domains, from air and water quality standards to prohibitions on pollution. This constitutional mandate holds particular importance, as it requires all subordinate laws to be enacted and enforced in harmony with the fundamental right to a healthy environment, thereby safeguarding essential rights to life, safety, and health for the benefit of the entire population.

Environmental Law has also played a pivotal role in advancing improvements to Brazil's basic infrastructure. The New Sanitation Framework, enacted in July 2020, set universal service targets for sewage treatment and water supply by December 31, 2033. Although achieving these targets requires substantial investment, the potential benefits—ranging from reduced healthcare costs and increased labor productivity to property value appreciation, growth in tourism, and enhanced environmental conservation—highlight the socio-economic promise of these improvements.

Beyond its social impact, Environmental Law has substantial economic implications within the framework of sustainable development. The constitutional mandate for environmental preservation applies to both public authorities and private entities, necessitating that environmental policies consider economic and market factors. Environmental protection incurs significant costs, which include active preservation efforts and the financial burden of institutional frameworks dedicated to resource management. In the private sector, this duty entails both internalizing environmental protection costs and adhering to legal restrictions on natural resource exploitation.

This need for environmental preservation, combined with its recognized economic value, has led to a shift in perspective, positioning environmental protection as a valuable economic asset rather than a mere expense. Mechanisms such as payments for ecosystem services, regulated carbon credit markets, public park usage concessions, legal reserve quotas, and green business initiatives now assign economic value to natural resources. Integrating natural resources into market dynamics has proven to be a vital preservation tool, encouraging companies to adopt best practices in socio-environmental responsibility.

In addition, consumer and contract regulations with environmental provisions have sought to promote a more conscious and sustainable consumption model. By ensuring the disclosure of sustainability information for available products, these regulations empower consumers to make informed choices based on companies' environmental impacts. This dynamic has encouraged companies to factor consumer expectations into their strategies by adopting environmental performance indices and assessing management and policy criteria throughout their operations. Likewise, public procurement processes that prioritize companies meeting environmental standards provide further incentives for businesses to implement sound environmental practices.

In conclusion, despite the numerous and pressing socio-environmental challenges still facing Brazil, the issues discussed in this article highlight the effectiveness of Environmental Law. Through strategic normative interventions, it has introduced measures that not only focus on environmental preservation but also contribute to significant social and economic outcomes.

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