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ENVIRONMENTAL LICENSING, CIVIL LIABILITY, AND ENVIRONMENTAL DAMAGE REPARATION: INTERFACES WITH ENVIRONMENTAL MANAGEMENT AND EDUCATION

LICENCIAMENTO AMBIENTAL, RESPONSABILIDADE CIVIL E REPARAÇÃO DO DANO AMBIENTAL: INTERFACES COM A GESTÃO E A EDUCAÇÃO AMBIENTAL

LICENCIAS AMBIENTALES, RESPONSABILIDAD CIVIL Y REPARACIÓN DE DAÑOS AMBIENTALES: INTERFACES CON LA GESTIÓN Y LA EDUCACIÓN AMBIENTAL

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Alexandre Hüller[1], Tiago Schneider de Jesus[2], Nycollas Stefanello Vianna[3], Gerônimo Rodrigues Prado[4], Caroline Fasolo[5], Dênis Silvano Domingues[6], Eduarda Portugal Canale da Silva[7], Marcia Regina Rodrigues da Silva Zago[8]

ABSTRACT

Environmental licensing constitutes a central instrument of the Brazilian National Environmental Policy, acting preventively in the assessment and mitigation of impacts resulting from human activities. In this context, civil liability and environmental reparation mechanisms assume a complementary role, especially considering the difficulty of fully restoring certain environmental damages. This study aimed to analyze environmental licensing, civil liability, and the mitigation of environmental impacts, highlighting their interfaces with environmental management and environmental education, as well as their contribution to environmental governance and the promotion of sustainable development. The research is characterized as qualitative, with an exploratory and analytical approach, based on bibliographic review and normative analysis of Brazilian environmental legislation, including Law No. 6,938/1981, the Federal Constitution of 1988, Complementary Law No. 140/2011, Law No. 15,190/2025, and CONAMA Resolutions No. 01/1986 and No. 237/1997,

[1] Doctoral student in Environmental Science and Technology. Universidade Federal da Fronteira Sul (UFFS). E-mail: alexandre.huller@gmail.com
[2] Doctoral student in Innovation, Technology and Sustainability. Universidade Federal do Rio Grande do Sul (UFRGS). E-mail: tiagosj@yahoo.com
[3] Doctoral student in Environmental Science and Technology. Universidade Federal da Fronteira Sul (UFFS). E-mail: nycollasvianna@gmail.com
[4] Doctoral student in Environmental Science and Technology. Universidade Federal da Fronteira Sul (UFFS). E-mail: geronimo-prado@uergs.edu.br
[5] Doctoral student in Environmental Science and Technology. Universidade Federal da Fronteira Sul (UFFS). E-mail: fasolocaroline@gmail.com
[6] Doctoral student in Environmental Science and Technology. Universidade Federal da Fronteira Sul (UFFS). E-mail: domingues.silvano@gmail.com
[7] Master student in Environmental Science and Technology. Universidade Federal da Fronteira Sul (UFFS). E-mail: eduardapcanale@outlook.com
[8] Dr. in Technology and Society. Universidade Tecnológica Federal do Paraná (UTFPR). E-mail: marciazagoz@gmail.com

in addition to theoretical contributions related to Environmental Law, environmental management, and environmental education. The results indicate that environmental licensing plays a strategic role in preventing environmental damage through the adoption of mitigation and compensatory measures, reducing the need for subsequent liability and reparation. It is concluded that the integration between environmental licensing, environmental management, and environmental education strengthens environmental governance and contributes to the implementation of more effective public policies aligned with sustainable development.

Keywords: Environmental Impact Mitigation. Environmental Management. Sustainable Development.

RESUMO

O licenciamento ambiental constitui instrumento central da Política Nacional do Meio Ambiente, atuando de forma preventiva na avaliação e mitigação de impactos decorrentes das atividades humanas. Nesse contexto, a responsabilidade civil e os mecanismos de reparação ambiental assumem papel complementar, especialmente diante da dificuldade de recomposição integral de determinados danos ambientais. O presente estudo teve como objetivo analisar o licenciamento ambiental, a responsabilidade civil e a mitigação de impactos ambientais, destacando suas interfaces com a gestão ambiental e a educação ambiental, bem como sua contribuição para a governança ambiental e a promoção do desenvolvimento sustentável. A pesquisa caracteriza-se como qualitativa, com abordagem exploratória e analítica, baseada em revisão bibliográfica e análise normativa da legislação ambiental brasileira, incluindo a Lei nº 6.938/1981, a Constituição Federal de 1988, a Lei Complementar nº 140/2011, a Lei nº 15.190/2025 e as Resoluções CONAMA nº 01/1986 e nº 237/1997, além de contribuições teóricas relacionadas ao Direito Ambiental, à gestão ambiental e à educação ambiental. Os resultados evidenciam que o licenciamento ambiental desempenha papel estratégico na prevenção de danos ambientais, por meio da adoção de medidas mitigadoras e compensatórias, reduzindo a necessidade de responsabilização e reparação posterior. Conclui-se que a integração entre licenciamento ambiental, gestão ambiental e educação ambiental fortalece a governança ambiental e contribui para a implementação de políticas públicas mais eficazes e alinhadas ao desenvolvimento sustentável.

Palavras-chave: Mitigação de Impactos Ambientais. Gestão Ambiental. Desenvolvimento Sustentável.

RESUMEN

La licencia ambiental constituye un instrumento central de la Política Nacional de Medio Ambiente de Brasil, actuando de manera preventiva en la evaluación y mitigación de impactos derivados de las actividades humanas. En este contexto, la responsabilidad civil y los mecanismos de reparación ambiental asumen un papel complementario, especialmente ante la dificultad de la recomposición integral de determinados daños ambientales. El presente estudio tuvo como objetivo analizar la licencia ambiental, la responsabilidad civil y la mitigación de impactos ambientales, destacando sus interfaces con la gestión ambiental y la educación ambiental, así como su contribución a la gobernanza ambiental y la promoción del desarrollo sostenible. La investigación se caracteriza como cualitativa, con un enfoque exploratorio y analítico, basada en revisión bibliográfica y análisis normativo de la legislación ambiental brasileña, incluyendo la Ley nº 6.938/1981, la Constitución Federal de 1988, la Ley Complementaria nº 140/2011, la Ley nº 15.190/2025 y las Resoluciones CONAMA nº 01/1986 y nº 237/1997, además de contribuciones teóricas relacionadas con el Derecho

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Ambiental, la gestión ambiental y la educación ambiental. Los resultados evidencian que la licencia ambiental desempeña un papel estratégico en la prevención de daños ambientales, mediante la adopción de medidas mitigadoras y compensatorias, reduciendo la necesidad de responsabilización y reparación posterior. Se concluye que la integración entre licencia ambiental, gestión ambiental y educación ambiental fortalece la gobernanza ambiental y contribuye a la implementación de políticas públicas más eficaces y alineadas con el desarrollo sostenible.

Palabras clave: Mitigación de Impactos Ambientales. Gestión Ambiental. Desarrollo Sostenible.

1 INTRODUCTION

The growth of human activities and the intensification of natural resource use have generated increasing pressure on ecosystems, resulting in environmental impacts that compromise environmental quality and the well-being of present and future populations. The expansion of economic activities, associated with urbanization and industrialization, has contributed to increasing environmental degradation, requiring the adoption of instruments capable of reconciling economic development, social justice, and environmental conservation. In this context, the implementation of legal and administrative mechanisms aimed at the prevention, mitigation, and compensation of environmental impacts becomes essential for promoting sustainable development (Sousa, 2017).

Historically, the environment has been affected by the intensive use of natural resources and the expansion of productive activities, factors that have increased the occurrence of environmental impacts and driven the creation of regulatory instruments aimed at environmental protection. The consolidation of sustainable development as a paradigm for environmental management and the incorporation of Environmental Law principles have contributed to strengthening public policies aimed at environmental conservation and the rational use of natural resources (Antunes, 2002).

In this context, environmental licensing stands out as one of the main instruments of the Brazilian National Environmental Policy, established by Federal Law No. 6,938/1981, with the purpose of reconciling economic development with environmental preservation. Environmental licensing consists of an administrative procedure through which the competent environmental authority evaluates the environmental feasibility of potentially polluting enterprises or activities, establishing conditions and preventive, mitigation, and compensatory measures aimed at reducing environmental impacts (Brazil, 1981; Farias, 2013).

Despite its relevance, environmental licensing is often criticized due to its complexity, procedural delays, and administrative bureaucracy, and is sometimes considered an obstacle to economic development. However, this instrument plays an essential role in ensuring that economic activities are developed in accordance with appropriate environmental criteria, safeguarding natural resources and the sustainability of productive activities. In this sense, the technical and administrative requirements of environmental licensing contribute to legal and environmental security for enterprises, in addition to strengthening environmental governance (Moraes, 2018; Guerra, 2019).

Recent studies also indicate that reforms aimed at flexibilizing environmental licensing may generate significant risks to environmental governance and biodiversity

conservation. Athayde et al. (2022) highlight that changes prioritizing process simplification and speed, without strengthening the technical and institutional capacity of environmental agencies, may compromise the adequate assessment of environmental impacts and increase the likelihood of environmental damage. In this context, environmental licensing remains an essential instrument to ensure environmental protection and sustainability in scenarios of economic expansion.

In addition to its preventive function, environmental licensing is closely related to civil liability for environmental damages, particularly when considering the principles of prevention and precaution. These principles guide decision-making within environmental licensing, enabling the adoption of anticipatory measures capable of avoiding or minimizing environmental impacts resulting from potentially polluting activities (Back, 2016). Thus, environmental licensing constitutes a fundamental instrument not only for environmental control but also for holding stakeholders accountable.

In the Brazilian legal framework, civil liability for environmental damage has a strict liability nature, based on risk theory, according to which the polluter is required to repair the damage regardless of proof of fault. This approach reinforces the importance of preventive action, considering that many environmental damages are difficult to reverse or impossible to fully restore, making prevention a central element of environmental policy (Milaré, 2015).

In this context, environmental damage reparation plays a complementary role to environmental licensing, involving different forms of environmental restoration, such as in-kind restoration, environmental compensation, and financial indemnification. However, environmental reparation is not always capable of fully restoring original environmental conditions, especially in cases involving biodiversity loss or degradation of sensitive ecosystems, reinforcing the importance of environmental planning and preventive action (Machado, 1998).

In addition to legal and administrative instruments, environmental education also plays a fundamental role in consolidating sustainable environmental management. The development of critical environmental awareness and the incorporation of sustainable practices into productive activities and public management contribute to reducing environmental impacts and enhancing the effectiveness of environmental policies. However, environmental education actions are still often developed in a fragmented and punctual manner, highlighting the need for greater integration between environmental education, environmental management, and public policy instruments (Lerino et al., 2009).

International literature has highlighted environmental licensing as a strategic instrument for minimizing environmental impacts and promoting sustainable development,

especially when associated with environmental management and environmental education. Studies indicate that environmental assessment contributes to integrating environmental, social, and economic dimensions, strengthening the balance among the pillars of sustainability and increasing the effectiveness of environmental policies (Bond et al., 2018; Morrison-Saunders et al., 2020). Furthermore, the incorporation of environmental management practices and institutional learning processes within environmental licensing promotes continuous improvement in decision-making and reduces environmental risks (Sánchez; Morrison-Saunders, 2011). Social participation and environmental education have also been identified as fundamental elements for preventing environmental impacts and building more sustainable decisions (Glucker et al., 2013; Pope et al., 2017).

Recently, the enactment of Law No. 15,190/2025, known as the General Environmental Licensing Law, introduced structural changes to the Brazilian environmental licensing system, focusing on process simplification, decentralization, and increased efficiency. These changes have generated broad technical and scientific debate, particularly regarding potential impacts on environmental protection and environmental governance, reinforcing the need for critical analysis of the role of environmental licensing in light of new institutional challenges (Brazil, 2026).

Thus, environmental licensing, combined with civil liability and strategies for mitigating and compensating environmental impacts, constitutes an important environmental governance instrument, contributing to the prevention of environmental damage and the promotion of sustainable development. In this context, the present study aims to analyze environmental licensing, civil liability, and environmental impact mitigation, highlighting their interfaces with environmental management and environmental education, emphasizing the role of these instruments in preventing environmental damage and promoting sustainable development.

2 METHODOLOGY

This study is characterized as qualitative research with an exploratory and analytical approach, developed through a bibliographic review and normative analysis related to environmental licensing, civil liability for environmental damage, and mechanisms for environmental mitigation, compensation, and reparation, considering their interfaces with environmental management and environmental education (Saldaña, 2011; Snyder, 2019). The choice of a qualitative approach is justified by the need to interpret complex phenomena associated with environmental public policies, environmental governance, and

environmental management instruments, allowing for a critical analysis of different theoretical and regulatory frameworks.

The bibliographic research was conducted through the analysis of books, scientific articles, environmental legislation, and technical documents relevant to the topic, with emphasis on the main legal instruments structuring environmental licensing in Brazil. Among others, the following were considered: Federal Law No. 6,938/1981, the Federal Constitution of 1988, Complementary Law No. 140/2011, Law No. 15,190/2025, and Resolutions of the National Environmental Council (CONAMA) No. 01/1986 and No. 237/1997. In addition, theoretical contributions from authors addressing Environmental Law, environmental management, and environmental civil liability were incorporated, such as Milaré (2015), Machado (2019), Sánchez (2018), Seiffert (2019), and Barbieri (2014), as well as international studies related to environmental assessment, sustainability, and environmental governance.

From a methodological standpoint, the study also presents a descriptive character, as it aims to examine and interpret legal and administrative instruments related to environmental licensing and environmental civil liability, without direct intervention by the researcher, according to the classification proposed by Barros and Lehfeld (2007). Furthermore, the research assumes an interpretative nature, enabling the understanding of the application of legal provisions and administrative instruments within the context of environmental public policies and contemporary environmental management.

The adopted methodology also incorporates the interdisciplinary perspective of environmental sciences, articulating elements of Environmental Law, environmental management, and environmental education, with the objective of understanding environmental licensing not only as a legal-administrative procedure but also as an instrument for sustainable environmental planning and management. This interdisciplinary approach allows for an integrated analysis of social, economic, and environmental aspects related to sustainable development.

Additionally, the study can be characterized as a narrative literature review, allowing the integration and critical analysis of different theoretical and normative perspectives related to environmental licensing, environmental civil liability, and sustainability. The narrative review is particularly appropriate for studies involving multiple fields of knowledge and aiming to discuss emerging concepts in environmental sciences and environmental governance (Barros; Lehfeld, 2007; Creswell; Creswell, 2018, Gil, 2012). Thus, the adopted methodology enabled an integrated analysis of legal, administrative, and educational instruments related to environmental licensing, highlighting their contributions to

environmental impact mitigation, prevention of environmental damage, and promotion of sustainable development.

3 ENVIRONMENTAL LICENSING IN THE NATIONAL ENVIRONMENTAL POLICY

Environmental licensing is established as one of the main instruments of the Brazilian National Environmental Policy, instituted by Federal Law No. 6,938, of August 31, 1981, which established legal and administrative mechanisms aimed at the preservation, improvement, and recovery of environmental quality in Brazil. Among these instruments, environmental licensing assumes a strategic role by acting as a control and management tool for activities potentially causing environmental degradation, with emphasis on preventive action (Brazil, 1981).

This legislation established, in Article 10, the requirement for prior environmental licensing for the construction, installation, expansion, and operation of enterprises or activities that use environmental resources and are considered effectively or potentially polluting. Thus, environmental licensing began to play a relevant role in the assessment of environmental impacts and in the definition of mitigation and compensation measures, with the objective of reconciling economic development with the conservation of natural resources (Farias, 2013).

Subsequently, the concept of environmental licensing was regulated by CONAMA Resolution No. 237 of 1997, which defines it as an administrative procedure through which the competent environmental authority licenses the location, installation, expansion, and operation of enterprises or activities potentially polluting or capable of causing environmental degradation, considering applicable legal provisions and technical standards (Brazil, 1997).

Another relevant instrument was established by CONAMA Resolution No. 01 of 1986, which instituted criteria and guidelines for Environmental Impact Assessment (EIA). This resolution defines environmental impact as any alteration in the physical, chemical, and biological properties of the environment resulting from human activities that may affect public health and well-being, biota, or the quality of environmental resources. As a result, prior environmental impact assessment became consolidated as an essential stage in the environmental licensing process (Brazil, 1986).

Later, Complementary Law No. 140 of 2011 regulated Article 23 of the Federal Constitution of 1988, establishing the distribution of administrative competencies among the Federal Government, States, and Municipalities in the exercise of environmental licensing. This legislation contributed to the decentralization of environmental licensing

activities, strengthening the role of federative entities and improving the efficiency of environmental management (Brazil, 2011).

Traditionally, environmental licensing is structured into three main stages: Preliminary License (LP), Installation License (LI), and Operation License (LO). The Preliminary License is granted during the planning phase of the enterprise, assessing environmental feasibility and establishing conditions. The Installation License authorizes the implementation of the project, while the Operation License allows its operation after verification of compliance with the established environmental requirements (Farias, 2013; Guerra, 2019).

These stages reflect the application of the principles of prevention and precaution, allowing early identification of environmental impacts and the adoption of measures aimed at mitigating or eliminating environmental damage. Thus, environmental licensing moves beyond a merely authorizing function, assuming a relevant role as an environmental planning and management instrument, guiding the development of economic activities in a sustainable manner (Barbieri, 2014; Sánchez, 2018).

Furthermore, environmental licensing contributes to the legal security of enterprises by establishing technical and legal criteria that guide the implementation and operation of potentially polluting activities. In this sense, environmental licensing allows prior identification of environmental impacts and the adoption of environmental management measures throughout the life cycle of the enterprise, contributing to the reduction of environmental risks (Seiffert, 2019).

From a sustainability perspective, environmental licensing also plays an important role in minimizing environmental impacts and promoting sustainable development. International studies indicate that environmental assessment processes contribute to integrating environmental, social, and economic criteria, strengthening decision-making and promoting greater balance among the dimensions of sustainable development (Morrison-Saunders et al., 2020).

Despite its relevance, environmental licensing still faces challenges related to regulatory complexity, the need for greater integration among environmental agencies, and increasing demand for efficiency in administrative processes. These challenges reinforce the importance of continuous improvement of environmental licensing as an essential instrument of Brazilian environmental policy, particularly regarding the prevention of environmental damage and the promotion of sustainable development (Moraes, 2018).

In this context, international studies have highlighted the importance of adopting best practices in environmental licensing to strengthen environmental governance and improve

decision-making efficiency. The adoption of clear technical criteria, greater institutional transparency, and expanded social participation significantly contribute to the effectiveness of environmental licensing, reducing socio-environmental conflicts and increasing legal certainty for enterprises (Godoi et al., 2022).

Thus, environmental licensing is consolidated as one of the main environmental governance instruments, acting preventively to minimize environmental impacts and promote sustainable practices, contributing to the effectiveness of environmental public policies and the protection of natural resources.

3.1 THE NEW GENERAL ENVIRONMENTAL LICENSING LAW (LAW No. 15,190/2025)

The enactment of Law No. 15,190/2025 represents one of the most significant changes to the Brazilian environmental licensing system since the establishment of the National Environmental Policy. In force since February 2026, the legislation introduced guidelines aimed at simplifying, accelerating, and decentralizing licensing procedures, promoting changes in administrative organization and in the distribution of competencies among federative entities.

Among the main innovations, the creation of the License by Adhesion and Commitment (LAC) stands out, designed for activities with low and medium environmental impact. Under this model, the developer assumes responsibility for meeting previously defined requirements through a declaration of compliance, reducing the need for detailed technical analyses by environmental agencies.

The legislation also expanded the autonomy of states and municipalities in environmental licensing, reinforcing the administrative decentralization already established by Complementary Law No. 140/2011. In addition, the Single Environmental License (LAU) was introduced, allowing certain projects to obtain authorization in a single stage, replacing the traditional model structured in successive phases.

Another relevant point concerns changes in the role of the Chico Mendes Institute for Biodiversity Conservation (ICMBio), with a reduction in the binding nature of its opinions in licensing processes involving protected areas. This change has generated debate regarding potential implications for environmental protection.

The new legislation also began prioritizing the analysis of direct impacts, reducing the emphasis traditionally given to indirect and cumulative impacts. This change has been the subject of scientific discussion, particularly regarding implications for long-term environmental assessment and for the effectiveness of environmental licensing.

Despite the proposed simplification, the law also expanded penalties for potentially polluting activities carried out without adequate environmental licensing. In this context, international literature indicates that simplification processes must be conducted cautiously, as reforms focused exclusively on accelerating procedures may compromise the effectiveness of environmental assessment (Bond et al., 2015).

Furthermore, Law No. 15,190/2025 has been subject to judicial challenges, highlighting the controversial nature of the changes and their potential impacts on Brazilian environmental policy. In this scenario, the new legislation reinforces the relevance of environmental licensing as a central instrument of environmental management and impact prevention. At the same time, it increases the need to strengthen environmental governance, the technical capacity of environmental agencies, and environmental education as fundamental elements to ensure the effectiveness of environmental protection under the new regulatory framework.

4 PRINCIPLES OF PREVENTION AND PRECAUTION IN ENVIRONMENTAL LICENSING

Environmental Law is grounded in principles that guide the interpretation and application of environmental regulations, among which the principles of prevention and precaution stand out as particularly relevant. These principles play a central role in environmental licensing, as they guide decision-making in situations involving potential environmental impacts, enabling the adoption of anticipatory measures aimed at mitigating or eliminating environmental damage (Back, 2016).

The Federal Constitution of 1988 establishes, in Article 225, that everyone has the right to an ecologically balanced environment, assigning to both the government and society the duty to defend and preserve it for present and future generations. This provision reinforces preventive action as a structuring element of Brazilian environmental policy, particularly within environmental licensing, where the objective is to anticipate impacts resulting from potentially polluting activities (Brazil, 1988).

The principle of prevention applies when scientific evidence exists regarding the environmental impacts resulting from a given activity. In such situations, environmental licensing acts as a planning and control instrument, requiring the adoption of mitigation or compensation measures or, when necessary, determining the infeasibility of the project in the presence of significant environmental risks. In this way, prevention supports the requirement for environmental studies, such as Environmental Impact Assessment,

enabling early identification of impacts and the implementation of environmental control measures (Thomé, 2016).

In turn, the precautionary principle is applied in scenarios of scientific uncertainty, when there is a possibility of serious or irreversible environmental damage. In these cases, the absence of full scientific certainty should not justify the omission of preventive measures, and environmental protection should prevail. Thus, the precautionary principle guides more cautious decisions in environmental licensing processes, particularly in projects with high potential environmental impact (Back, 2016).

According to Thomé (2016), while the principle of prevention operates in situations with consolidated scientific knowledge, the precautionary principle applies in contexts of uncertainty, both being essential for environmental protection. Therefore, these principles guide environmental agencies in the technical and legal analysis of licensing processes, supporting the definition of conditions and environmental control measures.

Within the scope of environmental management, the application of these principles contributes to reducing environmental impacts and promoting sustainable development. The requirement for environmental studies, continuous monitoring, adoption of less impactful technologies, and definition of mitigation and compensation measures represent practical examples of the application of these principles in environmental licensing (Barbieri, 2014; Sánchez, 2018).

International literature also highlights that environmental licensing, associated with environmental impact assessment, constitutes a relevant instrument for promoting sustainability. Studies indicate that environmental assessment contributes to minimizing impacts and integrating environmental, social, and economic dimensions in decision-making processes, reinforcing the preventive role of environmental licensing (Bond et al., 2018).

Furthermore, the application of the principles of prevention and precaution contributes to reducing the need for subsequent environmental reparation, since early identification of impacts decreases the likelihood of significant environmental damage. Thus, environmental licensing is consolidated not only as a control instrument but also as a mechanism for environmental governance and sustainable planning.

These principles also interface with environmental education, considering that their application requires technical knowledge and adequate professional training for environmental analysis and management. In this sense, the integration between environmental licensing, environmental management, and environmental education

strengthens environmental public policies and contributes to the adoption of sustainable practices.

Thus, the principles of prevention and precaution are consolidated as essential foundations of environmental licensing, guiding decision-making and strengthening the preventive role of environmental policy. Their application contributes to minimizing environmental impacts, mitigating potential damage, and promoting sustainable development, reinforcing environmental licensing as a strategic instrument of environmental governance.

5 ENVIRONMENTAL LICENSING, LIABILITY, AND MITIGATION OF ENVIRONMENTAL IMPACTS

Environmental licensing constitutes one of the main preventive instruments of the Brazilian National Environmental Policy, aiming to assess and minimize impacts arising from potentially polluting activities. In this context, environmental civil liability acts not only as a mechanism for reparation but also as a complementary instrument to environmental management, reinforcing the importance of planning and preventing environmental damage.

Within the Brazilian legal framework, civil liability for environmental damage is characterized as strict liability, based on risk theory, according to which the polluter is required to repair the damage regardless of proof of fault (Milaré, 2015). The Federal Constitution of 1988 reinforces this understanding by establishing that conduct harmful to the environment subjects offenders to administrative, civil, and criminal sanctions, without prejudice to the obligation to repair the damages caused (Brazil, 1988).

Despite the relevance of this legal instrument, the literature highlights that full reparation of environmental damage is not always feasible, especially in situations involving biodiversity loss, contamination of natural resources, or degradation of sensitive ecosystems. In such cases, environmental restoration or financial compensation may not be sufficient to fully restore original conditions, emphasizing the importance of the preventive role of environmental licensing (Machado, 1998; Milaré, 2015).

In this sense, environmental licensing assumes a strategic role in minimizing environmental impacts through the establishment of conditions, mitigation measures, and compensatory actions defined prior to project implementation. These measures contribute to impact reduction and encourage the adoption of more sustainable production practices, consolidating environmental licensing as an instrument of environmental planning and management.

Among the main strategies adopted are mitigation measures, aimed at reducing the magnitude of environmental impacts, and compensatory measures, applied when mitigation is insufficient to prevent environmental damage. These measures may include restoration of degraded areas, reestablishment of native vegetation, creation or maintenance of protected areas, and implementation of environmental programs, contributing to the maintenance of ecosystem services (Medauar, 2005; Sitowski, 2008).

The adoption of these strategies reinforces the preventive function of environmental licensing and contributes to the internalization of environmental costs, in accordance with the polluter-pays principle, encouraging the use of less impactful technologies and more sustainable production practices (Barbieri, 2014). In this way, environmental licensing guides economic development in a manner compatible with environmental carrying capacity.

Another relevant aspect concerns the role of public authorities in the environmental licensing process. The effectiveness of this instrument allows for early identification of impacts and the definition of appropriate environmental control measures. On the other hand, failures in the process may result in environmental damage and subsequent liability of the developer and, in certain situations, of the State itself, particularly in cases involving omission in monitoring or improper issuance of environmental licenses.

Furthermore, the integration between environmental licensing, environmental management, and environmental education contributes to reducing environmental impacts and promoting sustainable development. Environmental education, in this context, plays an important role in training professionals capable of identifying impacts and implementing preventive, mitigation, and compensatory measures, thereby strengthening environmental governance.

Thus, environmental licensing is consolidated as a fundamental instrument of environmental prevention and management, prioritizing mitigation and compensation of impacts before environmental degradation occurs. This approach reinforces the role of environmental licensing as an essential mechanism for promoting sustainable development and reducing the need for subsequent environmental damage reparation.

6 ENVIRONMENTAL LICENSING AS AN INSTRUMENT OF ENVIRONMENTAL MANAGEMENT AND ENVIRONMENTAL EDUCATION

Environmental licensing, beyond its administrative and legal dimensions, constitutes a relevant instrument of environmental management, acting preventively in the identification, assessment, and mitigation of impacts resulting from human activities. In this

way, environmental licensing goes beyond the mere issuance of authorizations, incorporating technical procedures that contribute to environmental planning and the promotion of sustainable development (Seiffert, 2019).

In this context, environmental management comprises a set of practices aimed at organizing human activities in order to reduce environmental impacts and promote sustainability. Environmental licensing, as a strategic tool, allows for the prior identification of impacts and the definition of control, monitoring, and mitigation measures, contributing to improved environmental quality and the prevention of environmental damage (Barbieri, 2014).

Recent literature also highlights the importance of sustainability assessment as a complementary instrument to environmental licensing. Mulligan (2026) notes that sustainability assessment frameworks enable the integration of environmental, social, and economic dimensions in decision-making processes, expanding the capacity of environmental management to promote sustainable development.

The requirement for environmental studies, control plans, and monitoring programs—common elements in licensing processes—also contributes to the adoption of more sustainable production practices and to the continuous improvement of environmental management within enterprises (Sánchez, 2018). In this sense, environmental assessment strengthens the integration between environmental planning and sustainable development (Pope et al., 2017; Dewi, 2024).

Another relevant aspect concerns the interface between environmental licensing and environmental education. The licensing process involves multiple stakeholders—developers, consultants, environmental agencies, and society—requiring the development of technical knowledge and professional training focused on preventing environmental impacts. Thus, environmental licensing contributes to the training of managers and professionals, strengthening environmental education applied to both public and private management (Seiffert, 2019).

Furthermore, environmental programs frequently established as licensing conditions—such as environmental education, restoration of degraded areas, and environmental monitoring—expand the preventive role of environmental licensing. Studies indicate that environmental education programs incorporated into licensing processes contribute to improved understanding of environmental impacts and to the reduction of environmental damage (Alves; Reis, 2024; Gomes; Kitzmann; Zamberlam, 2022).

Social participation also constitutes a relevant element in this process. International literature highlights that informed participation of social actors contributes to more

sustainable decisions and to the reduction of environmental conflicts (Glucker et al., 2013). In this sense, the integration between environmental assessment and sustainability strengthens decision-making and reduces long-term environmental impacts (Morrison-Saunders; Pope, 2013).

Moreover, environmental licensing contributes to balancing the environmental, social, and economic dimensions of sustainable development. International studies indicate that environmental assessment promotes integration of the sustainability tripod and enhances environmental governance (Morrison-Saunders et al., 2020; Bond et al., 2018). The incorporation of institutional learning processes and knowledge management also contributes to more sustainable decisions and to the reduction of environmental risks (Sánchez; Morrison-Saunders, 2011; Pope et al., 2017).

Thus, environmental licensing is consolidated as an integrated instrument of environmental management and environmental education, acting in the prevention and mitigation of impacts and in the promotion of sustainable practices. Its articulation with civil liability and environmental compensation mechanisms reinforces the role of environmental planning and environmental education as central elements of environmental governance and the promotion of sustainable development.

6.1 ENVIRONMENTAL LICENSING AND THE SUSTAINABILITY TRIPLE BOTTOM LINE

Environmental licensing can also be understood in light of the sustainability triple bottom line, a concept widely disseminated in international literature that integrates environmental, social, and economic dimensions into decision-making processes. This model, known as the Triple Bottom Line, was originally proposed by Elkington (1997) and has been widely used as a reference for evaluating public policies and sustainable environmental management practices.

Recent studies reinforce the importance of the sustainability triple bottom line approach in the formulation of environmental policies and decision-making processes. Nogueira et al. (2023) highlight that integrating environmental, social, and economic dimensions enables more balanced and sustainable decisions, contributing to the reduction of environmental conflicts and strengthening environmental governance at different institutional levels.

In the context of environmental licensing, the environmental dimension is addressed through environmental impact assessment and the definition of mitigation and compensation measures. The social dimension is incorporated through the analysis of impacts on local communities, population quality of life, and potential socio-environmental

conflicts. The economic dimension, in turn, is considered when evaluating project feasibility, provided that it is compatible with environmental carrying capacity and the principles of sustainable development (Sánchez, 2018).

This integrated approach reinforces the role of environmental licensing as a sustainable planning instrument, allowing decisions related to project implementation to simultaneously consider environmental, social, and economic aspects. In this way, environmental licensing functions as a mechanism of environmental governance, contributing to the implementation of more sustainable public policies.

In this context, environmental education plays a relevant role in consolidating the sustainability triple bottom line by promoting the training of professionals and managers capable of understanding the complexity of socio-environmental systems and adopting more sustainable decisions. Environmental education contributes to the integration of technical knowledge, environmental planning, and decision-making, strengthening environmental management and the implementation of environmental public policies (Sterling, 2010).

Furthermore, recent research has highlighted that the integration between sustainability and environmental governance is associated with the adoption of more robust and transparent institutional practices. Mishra and Pandey (2025) emphasize that incorporating the sustainability triple bottom line into environmental public policies contributes to improving environmental performance and strengthening sustainable development strategies. Likewise, environmental education has been associated with improved social participation in environmental assessment processes, contributing to more sustainable decisions and reducing environmental impacts throughout the life cycle of enterprises (Dewangan et al., 2025).

International literature also highlights that environmental assessment and licensing processes constitute essential tools for implementing sustainable development and reducing environmental risks associated with economic activities. Studies indicate that the integration between environmental assessment, planning, and sustainability contributes to improved environmental performance and the adoption of more sustainable production practices (Morrison-Saunders; Pope, 2013; Bond et al., 2015).

In this sense, environmental licensing assumes a strategic role in implementing sustainable development, acting as an instrument for balancing economic growth, environmental protection, and social well-being. This perspective reinforces the importance of integrating environmental licensing, environmental management, and environmental education, particularly in light of contemporary sustainability challenges.

Thus, incorporating the sustainability triple bottom line into environmental licensing broadens the understanding of this instrument, highlighting its role not only as a regulatory mechanism but also as a strategic tool for promoting environmental public policies and strengthening sustainable environmental governance.

7 FINAL CONSIDERATIONS

Environmental licensing has been consolidated as one of the main instruments of the Brazilian National Environmental Policy, acting in the prevention, planning, and control of activities potentially causing environmental impacts. Throughout this study, it was demonstrated that this instrument goes beyond its administrative dimension, assuming a relevant role in environmental governance by integrating legal, technical, and educational aspects aimed at promoting sustainable development.

The analysis of the principles of prevention and precaution reinforces that environmental licensing plays an essential role in anticipating environmental impacts, enabling the adoption of preventive, mitigation, and compensatory measures during the planning phase of projects. This approach reduces the occurrence of environmental damage and, consequently, the need for subsequent liability and reparation.

Regarding environmental civil liability, the Brazilian legal framework, by adopting strict liability, reinforces the importance of preventive action. Considering that many environmental damages are difficult or impossible to repair, prevention becomes a central element of environmental policy, highlighting environmental licensing as a strategic instrument of environmental management.

Environmental reparation, in this context, assumes a complementary role, prioritizing environmental restoration, compensation, or indemnification when damages have already occurred. However, the impossibility of full restoration in many cases highlights the importance of adopting mitigation and compensation measures previously defined within the environmental licensing process.

The study also demonstrated that environmental licensing has a direct interface with environmental management and environmental education, contributing to the training of qualified professionals, dissemination of sustainable practices, and strengthening of environmental public policies. From the perspective of environmental sciences, environmental licensing is configured as an interdisciplinary instrument, articulating technical, legal, and administrative knowledge.

Furthermore, environmental licensing should be understood as a strategic instrument for minimizing environmental impacts and promoting sustainable development,

especially when articulated with environmental management and environmental education. The integration of these dimensions contributes to balancing environmental, social, and economic aspects, strengthening environmental governance and sustainable decision-making.

The changes introduced by Law No. 15,190/2025 also reinforce the need for technical and institutional strengthening of environmental licensing, particularly in light of procedural simplification and administrative decentralization. In this scenario, environmental management and environmental education become even more relevant to ensure that process efficiency does not compromise the effectiveness of environmental protection.

Thus, strengthening environmental licensing, combined with environmental management and environmental education, constitutes an essential element for building more effective public policies and addressing contemporary sustainability challenges. Future studies are recommended to empirically evaluate the effects of Law No. 15,190/2025 on the efficiency of environmental licensing, the occurrence of environmental impacts, and the effectiveness of mitigation and compensation measures, contributing to the improvement of environmental governance in Brazil.

DECLARATION OF AI USE

The authors used ChatGPT-5.2 (OpenAI) to improve language clarity. The content was reviewed and edited by the authors to ensure accuracy and appropriateness.

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