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**Climate change and environmental impact on
integral risk theory**

<http://hdl.handle.net/11067/8183>
<https://doi.org/10.34628/JR1R-SH85>

Metadados

Data de Publicação

2024

Resumo

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Editor

Universidade Lusíada Editora

Palavras Chave

Responsabilidade ambiental - Brasil, Avaliação de riscos ambientais - Brasil

Tipo

article

Revisão de Pares

Não

Coleções

[ILID-CEJEIA] Polis, s. 2, n. 10 (Julho-Dezembro 2024)

Esta página foi gerada automaticamente em 2026-10-29T23:02:48Z com
informação proveniente do Repositório

Climate change and the environmental impact on integral risk theory¹

Mudanças climáticas e o impacto na teoria do risco integral

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Abstract: The responsibility for environmental damage for activities with a significant impact on the environment, in Brazil, as a rule, are guided by the theory of integral risk, making the agent responsible for the externalities of his activity, due to the development of a high-risk activity. Therefore, if the individual decided to operate a certain activity, he must be liable for any damage resulting from it, even if arising from acts of God or force majeure. This theory, developed still in the modern age, did not have climate change as its motto, which causes significant alterations in the structure of the environment, changing environmental structures and their possible transformation as a result of the increase in temperature. Weather occurrences, despite the use of high technology to predict catastro-

phes, occur completely fortuitous. Thus, in view of this rupture, the question is how to base the logic of integral risk on a consequent unknown future externality? Would we be facing a possible relativization of the integral risk theory as a result of unpredictable events resulting from climate change? Environmental responsibility in this situation must be increasingly broad, especially in the face of significant changes. Employing the deductive hypothetical method, through bibliographical and jurisprudential research, it is intended to discuss the possible occurrence of this theory in the current hypothesis in view of the unpredictable risks arising from climate change.

Keywords: Environmental responsibility; Integral risk theory; Climate changes; Environmental law; Risk created.

Resumo: As questões envolvendo a responsabilidade por dano ambiental para as atividades de significativo impacto ao meio ambiente, no Brasil, em regra, são pautadas pela teoria do risco integral, responsabilizando o agente pelas externalidades de sua atividade, em razão do desenvolvimento de atividade de alto risco. Portanto, se o indivíduo decidiu operar certa atividade deve responder por qualquer dano dela decorrente, ainda que advindo de caso fortuito ou força maior.

Essa teoria, desenvolvida ainda na idade moderna, não tinha como mote as mudanças climáticas, que ocasionam alterações significativas na estrutura do meio ambiente, mudando as estruturas ambientais e sua possível transformação em decorrência do aumento da temperatura. As ocorrências climáticas, não obstante o uso de alta tecnologia para prever catástrofes, ocorrem de maneira totalmente fortuita. Assim, diante dessa ruptura, questiona-se como pautar-se a lógica de risco integral numa consequente externalidade futura desconhecida? Estar-se-ia diante de uma possível relativização da teoria do risco integral em decorrência dos eventos imprevisíveis advindos das mudanças climáticas? A responsabilidade ambiental nessa situação deve ter cada vez maior amplitude, mormente diante de mudanças significativas. Empregando-se o método hipotético dedutivo, por meio de pesquisa bibliográfica e jurisprudencial pretende-se discutir a eventual ocorrência dessa teoria na hipótese vertente frente aos imprevisíveis riscos decorrentes das mudanças climáticas

Palavras-chave: Responsabilidade ambiental; Teoria do risco integral; Mudanças climáticas; Direito ambiental; Risco criado.

¹ This is an English version of the paper was originally published in Portuguese in VI Encontro Virtual do CONPEDI, 1; 2023; Florianópolis, Brazil. Available in: <https://site.conpedi.org.br/publicacoes/4k6wgq8v/984m56s5/X8X574vgK4O2GoEI.pdf>.

Introduction

Issues involving civil liability for environmental damage are governed by strict liability under national legislation. As a rule, they are based on the theory of risk. This means that anyone engaging in an activity that poses a risk to the public shall be liable for any resulting damage, regardless of intent or fault, especially in cases involving activities with significant impact on the environment.

Strict liability is grounded in the theory of integral risk, whereby liability is not excluded even in cases of fortuitous events or force majeure (MAZZILLI, 2019, p.731). The agent is thus held accountable for any externalities resulting from their activity due to the development of environmentally impactful operations.

Indeed, the original structure of strict liability did not account for addressing climate change, which can lead to significant alterations in the structure of the environment. With climate change, foundational environmental elements such as tides, winds, and seasonal patterns have shifted. As a result, weather events have become unpredictable, despite the existence of advanced technology for catastrophe forecasting.

In light of this disruption, this study aims specifically to examine the logic behind the adoption of the integral risk theory and to identify the possible types of externalities. The primary objective is to analyze whether a relativization of the integral risk theory would be possible due to the unpredictable events brought about by climate change.

The central question is: What level of environmental liability can be assigned in the face of climate change? It is known that this is a truly unstable area of law, and interpretations may vary widely.

Thus, the research begins with a brief analysis of the civil liability regime for environmental damage adopted in Brazil, particularly regarding activities that significantly impact the environment. The second section provides an overview of the concept and issues surrounding climate litigation, laying the foundation for the present discussion. The third and final section explores the potential relativization of the integral risk theory in light of the unlikely scenarios resulting from the effects of climate change.

Accordingly, this study intends to discuss a potential break from the integral risk theory in environmental matters, in light of the peculiarities of liability, especially considering the unpredictable risks arising from climate change. The research will employ hypothetical-deductive method, using bibliographic, documentary, and case law-based approaches.

1. Civil liability for environmental damage

When discussing civil liability, it is essential to briefly explore its origins and foundations. It can be said that it originated in the Law of Talion (an eye for an eye, a tooth for a tooth), the Law of the Twelve Tables (450 B.C.), and the Lex Poetelia Papiria (where liability ceased to be personal and became patrimonial in nature)—a system that is still adopted today (CASSETTARI, 2020, p. 389). It is worth noting that, originally, the concept of fault did not encompass the idea of liability (VILLEY, 2015).

Liability requires the occurrence of damage or at least the threat of it, consisting of “an obligation imposed on a person to compensate for material and moral damages caused to another by their own act or by the act of persons or things under their responsibility.” Liability can be civil, administrative, or criminal and, as a rule, arises from the breach of a legal duty. It may be contractual (arising from a contract) or non-contractual (arising from a legal obligation) (CASSETTARI, 2020, p. 397/399). Given the limited scope of this text, the focus here is on civil liability, specifically as applied to the environmental sphere.

In fact, civil liability presupposes the existence of damage, a causal link, and either an act of commission or omission (CASSETTARI, 2020, p. 396). In environmental matters, considering the nature of strict liability, the essential elements are the existence of damage and the causal nexus (BRASIL, STJ, 2014).

In this regard, the National Environmental Policy Act (BRASIL, 1981) expressly provides in Article 14, §1, for strict liability, whether the agent is a private party (natural or legal person) or the Public Administration (even indirectly). This same understanding is reinforced by the current Federal Constitution (BRASIL, 1988), which, in Article 225, §3, establishes the obligation of offenders to

repair environmental damage caused, including individuals and legal entities, whether public or private.

In other words, in environmental matters, civil liability is identified by the existence of a harmful activity that poses “risks to human health and/or the environmental balance,” provided that there is a causal link between the act or omission and the harmful result.

2. Theories of created risk and integral risk

In the environmental field, due to its distinct underlying logic, environmental damage is not necessarily linked to an unlawful act. Damage may occur even when the conduct is lawful, which nonetheless gives rise to a duty to compensate, since in this context, damage is related to the violation of a legal interest (FIORILLO, 2021). This encompasses both material and moral damages.

MATERIAL DAMAGE – also referred to in civil law as pecuniary damage, consists of harm (loss) that affects a certain interest related to the material goods of any Brazilian or foreign resident in the country (natural or legal person), either individually or collectively (with effects in both individual and meta-individual spheres), represented by the deterioration or even partial or total loss of such material (tangible) assets.

MORAL DAMAGE – consists of harm that affects a non-material interest of any Brazilian or foreign resident in the country (natural person), either individually or collectively (again, with effects in both individual and meta-individual spheres), constituted by the violation of intangible values of the human person protected by the Federal Constitution, fundamentally affecting the so-called “inner peace” of the person concerned (FIORILLO, 2021, p. 179/180)¹.

Environmental law operates under a logic grounded in the principles of precaution and prevention, which also includes the risk of damage (abstract risk), meaning the need to avoid the occurrence of potentially polluting activities. The mere occurrence of damage is sufficient to trigger liability (MILARÉ, 2016, p. 185); thus, as Cassettari (2020, p. 437) explains, civil liability in this context is strict and based on risk.

1 Free translate by the authors.

Moreover, considering the specific nature of environmental damage, particularly due to the plurality of its primary sources—in other words, environmental damage “may result from several concurrent, simultaneous, or successive causes and rarely has a single, linear source” (BENJAMIN, 1998, p. 54)—two theories have emerged regarding civil liability for environmental damage: the created risk theory and the integral risk theory.

According to the created risk theory, “the agent must compensate when their activity generates risk, regardless of whether or not there is economic gain. The risk must be inherent to the activity” (CASSETTARI, 2020, p. 434). Under this theory, it is possible to invoke certain defenses to exclude liability, such as fortuitous events, force majeure, the victim’s sole fault, or the act of a third party. It is assumed that all risk factors inherent to the activity are identified in advance and are capable of harming the legally protected interest.

On the other hand, the **integral risk theory** holds that “all risks connected to the enterprise, not only those inherent to it, must be internalized by the polluter” (MILARÉ, 2016, p. 341). In other words, under the integral risk theory, “no defenses excluding civil liability are allowed, as it does not even require a causal link as a prerequisite; it applies to environmental damage because the activity and the damage alone are sufficient” since the victim is the environment itself (CASSETTARI, 2020, p. 436). In summary, under this theory, all risks—both direct and indirect—that are related to the hazardous activity, even if not inherently its own, fall under the agent’s responsibility and, when materialized into damage, give rise to the duty to compensate (MILARÉ, 2016, p. 341)².

What ultimately distinguishes the two theories is the possibility of applying defenses that exclude civil liability by breaking the causal link, which is allowed under the created risk theory but not under the integral risk theory, where the mere execution of a risky activity suffices to establish liability in the event of environmental damage.

“Thus, in view of this rupture, the question is how to base the logic of integral risk on a consequent unknown future externality?”

Would we be facing a possible relativization of the integral risk theory as a result of unpredictable events resulting from climate change?”

3. Liability for international environmental damage

The occurrence of environmental damage may affect only the internal sphere of a country, meaning it remains within the bounds of national territory, which may in turn be local, regional, or interstate (involving more than one federative unit). On the other hand, it may extend internationally (transboundary), affecting the territory of another state.

While, at the domestic level, liability is based on strict responsibility guided by the theory of integral risk (BRAZIL, STJ, 2014), at the international level, the occurrence of transboundary environmental damage gives environmental liability a different outline.

Relations between foreign states in the international sphere are governed by Public International Law, understood as “an autonomous legal system regulating relations among sovereign states,” guided by coordination to ensure organized coexistence among them (REZEK, 2014).

Thus, international relations are permeated

by the concept of sovereignty, which is intrinsically linked to the concept of territory. This means that states possess sovereign power within their own territory and legal equality in international relations, with supreme, independent power, not conditioned or subordinated to any other state (MATIAS, 2014, pp. 35–36).

However, “[...] environmental problems, even if they are not of global scale, do not recognize borders and are not necessarily restricted to a single country’s territory” (NASSER, 2006, p. 20). Nor is there a “central authority vested with force and legitimacy” to apply sanctions (REZEK, 2014), which makes the issue of liability for environmental damage in the international context even more complex. The current logic of international environmental liability was historically shaped by the **Trail Smelter Case**, involving lead and zinc smelting that occurred between the late 19th and early 20th centuries—a dispute between the United States and Canada. In this case, smoke emitted from Canadian smelters was carried by winds across the border, causing damage to American crops, fauna, and flora (UN, 2006).

As there were no domestic laws to absorb the claim, nor international norms to govern such disputes, the matter was resolved through a lengthy arbitration process between the states, which established what is now known as the “no-harm rule”—prohibiting a state from using its territory in a way that causes harm to the territory of another state (BODANSKY et al., 2017, pp. 44–45). In this sense, “[...] no state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein” (UN, 2006, p. 1965).

This rule was incorporated into the **1972 Stockholm Declaration**, indicating a certain weakening of the original concept of sovereignty. As such, even within its own territory, a state may not exploit its resources indiscriminately or without limits to the point of causing harm to other states, as reflected in Principle 21:

In accordance with the Charter of the United Nations and the principles of international law, **States have the sovereign right to exploit their own resources pursuant to their own environmental policies**, and the responsibility to

2 Free translate by the authors.

ensure that activities within their jurisdiction or control **do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction** (CETESB, 2022a)³.

Thus, a state's sovereign right to use its territory and exploit its resources is limited by its duty to prevent transboundary harm. Accordingly, it has a duty to prevent damage and, if it develops a significant and potentially polluting activity, it also has the duty to notify neighboring states of such risks—that is, the **duty of due diligence** (BODANSKY et al., 2017, pp. 41–43), as provided in Principle 2 of the **1992 Rio Declaration on Environment and Development**:

Principle 2: States have, in accordance with the Charter of the United Nations and the principles of international law, the **sovereign right to exploit their own resources pursuant to their own environmental and developmental policies**, and the responsibility to ensure that activities within their jurisdiction or control **do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction** (CETESB, 2022b)⁴.

In the evolution of states' environmental responsibilities, the no-harm rule and the duty of due diligence remain intact. However, it must be acknowledged that states are unequal in terms of development. Still, in international relations, they are equal in power and independence (due to the principle of sovereignty). This leads to the adoption of the principle of “common but differentiated responsibilities,” which balances the duties and obligations of states in accordance with their respective levels of development.

An illustrative example is found in the Ozone Layer Protection Regime, especially the Montreal Protocol (1987), under which all parties share common responsibilities, but with specific duties based on their development level—granting them extended deadlines or financial assistance for implementing new technologies to meet the regime's objectives (YOUNG, 2010, pp. 23–52).

This same principle also underpins the climate change regime, as reflected in the preamble of the United Nations Framework

Convention on Climate Change (UNFCCC):

“[...] the global nature of climate change calls for the widest possible cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities and their social and economic conditions.” (CETESB, 2022c)

Therefore, perhaps the greatest current challenge lies in addressing climate change and establishing effective legal mechanisms allowing one state to hold another accountable for climate-related violations. This requires demonstrating a breach of the no-harm rule and the duty of due diligence. It is also necessary to prove that the activities under the jurisdiction or control of the other state caused, or pose a quantifiable risk of causing, significant harm in the claimant state's territory (BODANSKY et al., 2017, pp. 44–45), especially considering that the international system lacks a clear and objective standard regarding states' duty of diligence—particularly in relation to climate change and the disputes arising from its impacts.

4. Climate litigation

Although the Paris Agreement has coordinated a considerable range of national contributions and the system developed under the United Nations Framework Convention on Climate Change has incorporated principles such as the no-harm rule and the duty of due diligence, there is no clear accountability system for states to implement preventive and mitigating measures aimed at reducing pollutant emissions or other negative effects that cause harm to other states due to global warming. These are effects whose causes are complex to determine, such as rising sea levels, floods, droughts, etc. (BODANSKY et al., 2017, p. 45).

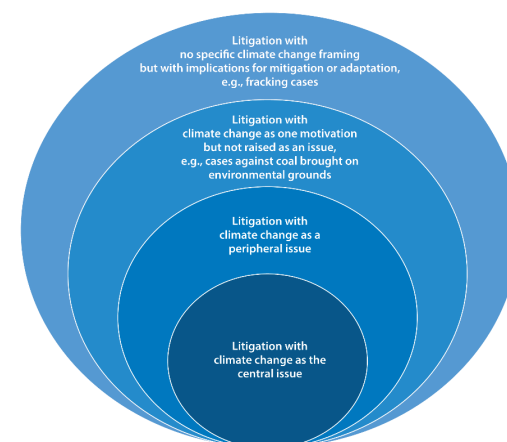
Indeed, the climate issue involves a wide range of actors, particularly in the domestic context, given the need for states to adopt public policies to implement the principles, standards, rules, and procedures of the climate change regime. In this sense, it is observed that “alongside the engagement of the Legislative and Executive branches, the Judiciary has increasingly been called upon to rule on the application of the rights and obliga-

tions established by these laws and policies” (SETZER et al., 2019, p. 23).

When discussing climate change, it becomes evident that relationships operate within a more complex framework, where the resulting damage is significantly more widespread, with extended temporal causality and diffuse dimensions. Thus, climate-related issues are multicausal factors that produce profound impacts on the community as a whole, demanding the application of domestic jurisdiction.

The term climate litigation has been used to refer to judicial and administrative claims related to climate change, encompassing “a broad spectrum of actions that are not only directly but also indirectly connected to climate change” (SETZER et al., 2019, p. 25), which Peel and Osofsky (2020) represent in concentric circles.

Figure 1: Different notions of climate litigation.



Peel J, Osofsky HM. 2020. *Annu. Rev. Law Soc. Sci.* 16:21–38

Source: PEEL, Jacqueline; OSOFSKY, Hari M. *Climate change litigation*. Annual Review of Law and Social Science, v. 16, n. 1, p. 21–38, 2020.

Based on the figure above, Peel and Osofsky (2020) acknowledge that the concept of climate change litigation can extend beyond cases specifically centered on climate change, as many issues raised in these disputes are indirectly related to it. In other words, climate change may serve as a clear motive or consequence within a legal process, even if it does

3 Text not highlighted in the original. Highlights made in this text to emphasize the argument.

4 Text not highlighted in the original. Highlights made in this text to emphasize the argument.

not constitute the central legal argument presented in court.

The 2020 United Nations Global Climate Litigation Report states that “[...] although climate change cases are based on a wide range of legal theories and are brought before various courts, tribunals, and other forums around the world, they generally face common legal issues” (UNDP, 2020).

It can be said that these lawsuits are expected to bring innovations to the international legal academic community, particularly because they help establish important legal standards. In general terms, climate litigation cases submitted to courts and investigative bodies involve issues related to the reduction of greenhouse gas (GHG) emissions (mitigation), the reduction of vulnerability to the effects of climate change (adaptation), the reparation of damage suffered due to climate change (loss and damage), and the assessment and management of climate risks (risks) (SETZER et al., 2019, p. 27).

Although the issue is not entirely new and there has been an increasingly urgent need to address the consequences of climate change—especially regarding the liability of states for their actions or omissions in public policies—Setzer et al. (2019, p. 26) note that the first court case dealing with the issue occurred in the United States in 1990, and the first case explicitly framed as climate litigation was filed in 1994 by Greenpeace in New South Wales, Australia.

Currently, according to the latest report by the United Nations Development Programme (2020, p. 11), there are approximately 1,550 climate litigation cases in thirty-eight countries, with 1,200 of those in the United States alone. This reflects a significant increase in such legal actions, as in 2017 there were 884 cases in twenty-four countries, including 654 in U.S. courts.

The growth of these cases is of notable importance, as it drives local governments and the private sector to adopt mitigation and adaptation measures within their jurisdictions (UNDP, 2020, p. 11). It is also important to consider the strategic use of such actions, given that judicial decisions carry coercive authority and may increase pressure for the advancement of climate governance. These disputes exert considerable moral and regulatory influence, drawing greater attention

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from the public, non-governmental organizations, academia, and the media (SETZER et al., 2019, pp. 29–31).

As Allen (2003) points out, it is not always evident how specific climate events can be attributed to exogenous climate change factors due to their multifaceted nature. This further complicates judicial liability, as the issue is tied to global sustainability and the survival of the planet.

5. The relativization of the theory of integral risk due to climate change

The phenomenon of climate change has produced factual outcomes that lead to a rethinking of legal structures and hitherto known interpretive standards (PRESTES, 2010). In Brazil, especially concerning civil liability for environmental damage, the issue takes on a unique dimension, considering that the country has significant agricultural and livestock activity, which “[...] is the main driver of Brazilian greenhouse gas (GHG) emissions,” making it the seventh largest global emitter (WEDY, 2019, p. 87).

Steigleder (2019), starting from the premise that environmental damages properly stem from the development of civilized humanity, therefore originally diffuse and historical, which does not allow for the identification of the causative agents, highlights that this contributes to the difficulty in establishing

adequate attribution; since attribution based solely on risk is not sufficient for addressing cases arising from climate change, due to its inherently diffuse nature.

Thus, basing liability for environmental damage solely on the logic of integral risk, considering the unknown externalities arising from climate change, is a complex mission, which Allen (2003) highlights by noting the need to understand the difference between weather and climate.

In the 21st century, climate is what is predictable, weather is what you feel (experience). Climate means “possible weather,” or what a statistician would call ‘expected weather’ and its variability for a given time of year, given all the properties of the ocean-atmosphere system, current levels of greenhouse gases, solar activity, and so on.

In practice, all we can directly observe is the weather, i.e., the actual trajectory of the system over the climate attractor during a limited period. Therefore, we can never be sure, with finite observations and imperfect models, what the climate is or how it is changing (ALLEN, 2003).

The weather that passes in the phenomenal world is only known from its occurrence, so it is not sufficiently known, only a probability, almost certain, from scientifically quantified data, which establish the probable climate (ALLEN, 2003). In this same sense, Article 1 of the United Nations Framework Convention on Climate Change:

1. “Adverse effects of climate change” means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience, or productivity of natural and managed ecosystems, or on the operation of socio-economic systems or on human health and well-being. 2. “Climate change” means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and which is in addition to natural climate variability observed over comparable time periods.” (BRASIL, 1998)

Thus, in the risk framework, by predicting the probabilities of climatic occurrences, one acts in a precautionary manner, and the risks of the activity must be incorporated into the production processes, “so as to avoid the quantitative and qualitative appropriation of

natural elements” (STEIGLEDER, 2004, p. 264), based on technical studies carried out for environmental licensing, a true instrument of prevention, through which the risks inherent to that activity are verified, which will be managed in order to prevent the licensed activity from causing damage (LEAL, 2019, p. 302).

However, the dialectic of climate and weather is altered and improbable in the face of the impacts of climate change, making it no longer possible to establish possible climate forecasts, thereby deconstructing the causal link when dealing with strict liability for risk, given its “planetary, intergenerational character and its diffuse origin, intertwined with the historical processes of constructing prevailing civilizational values: consumption patterns, ideals of wealth, energy models, etc.” (STEIGLEDER, 2019).

In fact, the risks arising from climate change are invisible and unpredictable, making liability, specifically due to climate change very complex. Thus, the risk internalized by the person who carries out a significantly polluting activity is that which is quantifiable, predictable, contained in the prior studies for licensing, i.e., “[...] the entrepreneur must internalize in their productive activity the costs associated with preventing negative impacts and with controlling identified risk factors” (STEIGLEDER, 2003).

Considering unforeseeable and unthought-of environmental risks, if damage occurs from an event that has never happened, not even scientifically foreseen for the locality, it can be affirmed that there would be a severance of the causal link required for the configuration of strict liability. In these cases, jurisprudence must evolve to outline a possible solution, or a regulation must be issued containing objective parameters for liability.

Final considerations

Civil liability for environmental damage, which is strict in nature, is anchored in risk theory, with a legal basis in Article 14, §1º, of Law No. 6.938/1981, meaning that, regardless of whether prior environmental licensing exists (lawful activity) or not (unlawful activity), whoever carries out a risky activity is responsible for repairing the damage, even if they did not cause it.

However, the risks assumed by the entrepreneur of the licensed activity are quantifiable, known risks that can be internalized in the costs of the production chain. This logic lacks grounding when dealing with climate changes resulting from greenhouse gases, which go beyond issues of precaution and prevention, considering that the latter (prevention) presupposes the existence of known risks and the former (precaution), risks, although unknown, are predictable.

Thus, what is seen is a rupture in the cognitive chain of risks of the activity harmful to the environment, transcending the specific requirements of strict liability, even from the perspective of integral risk.

It is fundamental that there is a forward-looking perspective in order to rethink existing structures and to operationalize the possibility of strict liability for the polluter, with possible effects on the climate, especially in terms of local and global warming. This is not an exceedingly complex task, as environmental impact studies can be directed towards obtaining possible data for the verification of the harmful effects of the activity, particularly in terms of intermittent or continuous heat production generating possible implications in the present and future.

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