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A CRITICAL ANALYSIS OF THE MARIANA/MG DISASTER

UMA ANÁLISE CRÍTICA DO DESASTRE DE MARIANA/MG

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Abstract
This article seeks, initially, to understand the concept of Rule of Environmental Law, analyzing whether it is in force in the national legislation. Subsequently, the study goes on to identify the failures and consequences of the Fundão dam collapse in 2015. The theme of Environmental Law is still constantly neglected by part of the population, which, by living based on immediate paradigms, fails to consider the effects of their actions, as in the case studied here. It is necessary to seek alternatives to current anthropic practices, seeking conducts that focus not only on

Resumo
Este artigo busca, inicialmente, compreender o conceito de Estado Ambiental de Direito, analisando se ele vigora na legislação pátria. Posteriormente, o estudo parte para uma identificação das falhas e consequências do rompimento da barragem de Fundão, em 2015. A temática do Direito Ambiental ainda é constantemente negligenciada por parte da população, que, ao viver baseada em paradigmas imediatistas, deixa de considerar os efeitos de suas ações, como no caso aqui estudado. É necessário buscar alternativas perante as práticas antrópicas atuais, buscando condutas que foquem não apenas o indivíduo,

the individual, but also on the community. Thus, the question arises: would the Rule of Environmental Law be able to foresee, and even avoid, the consequences of the Mariana/MG disaster in 2015? The objective of this research, through its applied methodology, is to answer this problematic question from the pillar of Disaster Law. After applying the premises of the aforementioned institute to the 2015 tragedy, it is concluded that, although the Brazilian legal system provides for the Rule of Environmental Law, it still does not work effectively. In the production of the article, a qualitative, exploratory, doctrinal and documentary research was carried out, based on the theoretical bibliographic survey.

Keywords: Mariana disaster; Disaster Law; Rule of Environmental Law.

mas, também, a coletividade. Assim, surge o questionamento: seria o Estado Ambiental de Direito capaz de antever, e até mesmo evitar, as consequências do desastre de Mariana/MG em 2015? O objetivo desta pesquisa, por meio de sua metodologia aplicada, responderá a essa questão-problema a partir do pilar do Direito dos Desastres. Após a aplicação das premissas do supracitado instituto na tragédia de 2015, conclui-se que, em que pese existir no ordenamento jurídico brasileiro disposição para o Estado Ambiental de Direito, este ainda não funciona efetivamente. Na produção do artigo foi realizada uma pesquisa qualitativa, exploratória, doutrinária e documental, pautada no levantamento teórico bibliográfico.

Palavras-chave: *desastre de Mariana; Direito dos Desastres; Estado Ambiental de Direito.*

Introduction

The currently observed socio-environmental configuration projects a humanity that, supported by the technological advancement, holds the power and destructive capacity at high potential. In this regard, events and disasters such as the one in Mariana/MG, in 2015, bring to light the need to reflect on a new structure in which Environmental Law is consolidated as one of the main principles of the national legal system, emerging, in the context at issue, the Rule of Environmental Law.

This article seeks to analyze whether this institute would be able to prevent or avoid the Mariana disaster. Initially, the conceptualization of this structure was approached, checking if it already exists in Brazil. At this point, it was necessary to distinguish the "Environmental Rule of Law" from the "Rule of Environmental Law", making it clear that, although the former is in force in Brazil, the latter proves to be the most effective in complying with environmental guidelines. This is justified by virtue of its important pillars, which place the environment in the foreground, even in the face of advantageous economic benefits. One of these

pillars is Disaster Law, which, with its prevention and mitigation phases, seeks to prevent and mitigate these events, giving prominence to the issue of environmental protection.

Based on what was seen, a case study on the Mariana/MG disaster and its consequences was carried out. When verifying the various failures that occurred, in both the prevention and the mitigation phases, it was evident to conclude that, if the Rule of Environmental Law were in force in Brazil, its problems would not exist, given that Samarco would be prevented from acting, due to its numerous environmental infractions.

It was found that most studies on the subject understand, as well as this article, that it is unfeasible to continue with a legislation and a governmental posture that protect the environment in such a superficial way. Thus, it is concluded that the structure that proved to be the most effective was the Rule of Environmental Law, which, together with Disaster Law, works so as to prevent unsustainable economic precepts from being preferable to environmental principles.

This research pointed out some considerations about the proposed theme, in order to stimulate critical reflections to the readers regarding the relevance of the subject developed, reiterating the pertinence of the environmental dimension in the anthropic relationship with nature, as well as the harmful consequences arising from its imbalance/disrespect.

In order to carry out this study, qualitative, exploratory, bibliographical and documentary research was used, resorting to doctrines, scientific journals, journalistic articles and other sources that strengthen the text.

1 The Rule of Environmental Law and Disaster Law

The migration of *homo sapiens* across Planet Earth caused a mass extinction in different parts of the globe, whether in New Zealand, where 60 per cent of all bird species was extinct, or in Australia, where 96 percent of animal species weighing 50 kilograms or more disappeared (HARARI, 2017). It is possible to observe that the devastating relationship between human beings and the environment has not changed since then, affecting the global ecosystem balance.

The negative interference provided by human activities in the planet demonstrates high rates "incomparable in history, largely due to the effects of mastering new technologies and a very intense interaction between different cultures, modes of production and the broad global consumer market " (GARCIA, 2021, p. 119).

Since the birth of Law in Modernity, in its logical-formal instruments, it

has not been possible to respond to the conflicts present in the globalized world, despite the recognition around the "construction of a modern capitalist economy. The misunderstandings present in the current century deepen the crisis of modern paradigms, both in the science of Law and in capitalism" (FAUTH; OLIVARES, 2022, p. 148).

Thus, "in addition to the conception of a new dogmatics, it is necessary for the Law to act as an instrument of regulation or limitation of power. It is essential to shield social subjects and processes in order to guarantee the rights of the vulnerable" (FAUTH; OLIVARES, 2022, p. 149). The study of each and every institute necessarily involves a historical understanding of the factors that generated it. Thus, even before discerning the Rule of Environmental Law, it is essential to remember how the historical positivization of human rights occurred, given that the regiment analyzed here would not exist without the consecration of these rights.

The positivization of individual guarantees, such as freedom, gained strength in a period in which the State, represented by the monarchy, oppressed individuals in order to fulfill and sustain the desires of this small class. In this scenario, Bobbio (1992, p. 54) clarifies that the proclamation of its prerogatives, evidenced by the French Revolution (1789-1799), was the "expression of the demand for limits to the superpower of the State, a demand that, if when it was made could benefit the bourgeois class, retained a universal value".

However, with the advent of industrial revolutions, it became evident that, despite the existence of equality in law, its equivalence was only formal. It was considered, in practice, that social factors caused a very great dissonance between the realities experienced by the different classes of the population. Therefore, the rights of freedom, although important in their insurgency, were no longer sufficient to remedy social problems, making it pertinent to go beyond the letter of the law, causing real changes (BOBBIO, 1992). With this, the figure of an interventionist State is envisioned, which provides, both formally and materially, social, cultural and economic guarantees. The rights of equality, fundamental rights, became part of the constitutions.

It so happens that the horrors of the world wars I and II gave rise to a dimension of fundamental rights, hitherto unknown, which takes up fraternity as a legal principle, with a concern for transindividuality. In this regard, the focus becomes the guarantee to the environment, development, peace, self-determination of peoples and the common heritage of humanity (BONAVIDES, 2004). It is in this sense that the paradigm of sustainable development "needs a critical

examination, since it is limited in the sense of promoting equity and the balance of economic, environmental and social forces in the current globalized world" (FAUTH; OLIVARES, 2022, p. 150).

Through the teachings of fraternity as a legal category embodied in the Brazilian legal system, based on the preamble of the Federal Constitution of 1988 (MACHADO, 2017), humanity reaches a point where it begins to discern the consequences of its actions. Through fraternity, human beings are made aware of their social responsibilities (jointly with the Government) in environmental protection before the "Other" and the community (JABORANDY, 2016), with respect to current and future generations.

Whether through war between nations, deforestation or pollution and destruction of biodiversity, the persistence of deleterious anthropic conduct inevitably leads to the end of the human race. It is in this context that the debate on the Rule of Environmental Law begins and the importance of a system that, in particular, links all its decisions to the basic principles of Environmental Law (CARVALHO; DAMACENA, 2013). On the subject, Canotilho (2004, p. 132) highlights:

> Therefore, based on the constitutionalization of environmental matters (art. 225, CF), the (Environmental Democratic) State has the function of structurally integrating the various existing discourses in society (law, economics and politics), under an ecological awareness and from the moral perspective of fundamental rights as a "social superdiscourse".

Moreover, going through the analysis of the human being-nature relationship in the emerging ecocentric paradigm and the anthropic intervention on Planet Earth, it becomes essential to recognize the environmental advances regarding the legal status of nature, rebalancing this relationship and seeking ecological integrity as something essential for respect for life in all its forms. Based on the constitutional experiences of Ecuador (2008) and Bolivia (2009), it is necessary to emphasize the provision of the rights of nature, as well as of its natural elements, overcoming the obsolete conception of utilitarianism, in order to attribute intrinsic dignity/value to them. In this sense, the Constitution of Ecuador (2008) was the first in the world to expressly recognize in its text the rights of nature (*Pachamama*) (FENSTERSEIFER; SARLET, 2020).

By adopting the models of *living well* (Bolivian) and *good living* (Ecuadorian), it becomes possible to glimpse the advances around the protection of nature, recognizing it as a subject of rights. Through intercultural dialogues, these protective frameworks adopted the Plurinational State model, characterized by

environmental respect (NASCIMENTO; LIDORIO; PONTES FILHO, 2020).

With the leadership of the Plurinational State of Bolivia, for example, several intergovernmental negotiations on the principles of harmony with nature have been initiated since 2009 (with the Declaration of International Mother Earth Day by the General Assembly). It is worth mentioning that some of the resolutions approved by the United Nations General Assembly involve interdisciplinary dialogues that contribute to the jurisprudential advances of the Earth, the environment and the rights of nature, seeking the promotion of a reformulated sustainable development – concerned with health and well-being for all. Certainly, all institutions of human society must promote alignment with respect to sustainability and the implementation of the 2030 Agenda. The protection of ecosystems and the fight against practices harmful to the environment are encouraged (UN, [2022?a]).

Based on the teachings exposed by the resolutions, over the last few years, there has been a concern to foster debates in order to emphasize the importance of anthropic harmony with nature, as well as environmental protection. Thus, the aim is to inspire people to establish a more respectful socio-environmental interaction with a view to sustainable development (UN, [2022?a]). Bearing in mind that humanity and nature share a primordial existential bond, it becomes essential to adopt actions that respect this aspect. One thereby evolves towards the recognition of the rights that are inherent to nature: existence, prosperity and evolution (UN, [2022?b]).

In the Brazilian field, it is clear that the Federal Constitution of 1988 (CRFB) demonstrates

> […] the sensitivity of the constituent to the demands of a new democratic order, which demanded recognition of the quality of life as a result of ecological balance. The conception of this relationship was embodied in the new environmental good, a legal institute renewed from the Roman traditions and the last centuries of evolution of Public Law. The environmental good, foreseen in the Federal Constitution, brought new characteristics, which connect it to the diffuse interests and the immateriality of the object which it seeks to express (GARCIA, 2021, p. 119).

As highlighted by the fundamental right to an ecologically balanced environment, along the lines of art. 255, *caput*, of the CRFB (BRASIL, 1988), the Government and society have the great

> […] constitutional duty to preserve the environment for present and future generations, being strictly linked to precaution against acts that may cause damage or imbalances in the environment that, consequently, pose risks to life. Because

> of this, omission becomes a way to find precaution and preserve the environment and strengthen this legal institute in the constitutional category (BOUSFIELD; SOUZA, 2021, p. 41).

It is pertinent to recognize the "preponderance of the duty to preserve the environmental good, beyond the fundamental Rights of its subjects, imposing limits and objective guidelines for the pursuit of an environment balanced by its intrinsic values" (GARCIA, 2021, p. 117). By the way, fundamental duties are also instruments "for realizing the dignity of the human person, from the moment they constitute a material substrate for the effectiveness of fundamental rights" (BOUSFIELD; SOUZA, 2021, p. 44).

Given this contextualization, it should be noted that some scholars consider the Environmental Rule of Law and the Rule of Environmental Law to be synonymous with a single institute. However, this article understands that etymologically they are different institutes. The former comprises a structure that, among its concerns, takes into account environmental aspects. The former previously integrates any and all state action, whether legislative or political, for a sustainable interpretation.

As an example, the State, in both aforementioned regulations, will take environmental aspects into account when approving a dam construction permit. In the Environmental Rule of Law, if the construction of the dam is inevitably linked to causing damage to the environment, these will be forgiven in the face of a high economic benefit. On the other hand, in the Rule of Environmental Law, if the damage or risks to the environment are greater than the capacity to restore the status quo, there will be no construction at all, even if this causes economic losses.

The environment should not be seen only from the perspective of an isolated scenario, but as a core part

> […] in the very social production of space. This space that reflects and interferes in the culture of a place and a historical period; in the means of subsistence of a given social context and in their meanings", as well as "in the forms of appropriation of natural goods and territory (FAUTH; OLIVARES, 2022, p. 142).

It is even possible to observe the Environmental Rule of Law currently in force in Brazil. For this, the provisions of art. 2, XIII and XIV, of Law no. 9,985/2000, bringing the definition of two actions that serve to restore the damage caused by anthropic conduct in certain regions: recovery and restoration (BRASIL, 2000).

Although both institutes seek to remedy environmental impacts, in "recovery" there is no need for a link to the status quo, while "restoration" makes this

issue essential. A posteriori, attention should be directed to the fact that Decree no. 9,406/2018, in its art. 5, §§ 2 and 3, I, establish, for example, that the miner is responsible for recovering degraded areas, completely ignoring the restoration of these spaces (BRASIL, 2018).

It is evident that, despite taking Environmental Law into account, Brazil does not make it one of its concrete main principles, so as to allow the exploited site to be, in some situations, merely recovered. This can cause, for example, the extinction of some species. There is no doubt that these conceptions were also responsible for disasters such as the one in Mariana/MG, in 2015, given that, despite the potential risk of rupture, the supervisory bodies and the company itself continued to allow the operation to function, with the intent to remain profitable. At the time, the Public Prosecutor for the Environment, Carlos Pinto, clarified: "It was not an accident. It was not unavoidable. What happened was an error in the operation and negligence in monitoring" (HOUVE NEGLIGÊNCIA…, 2015).

It is in the face of this situation that the Rule of Environmental Law stands out: for it, it is not enough that the principles of Environmental Law are treated as secondary, requiring consideration at the heart of decisions and aiming to react to the problems that have arisen with contemporary society (CARVALHO ; DAMACENA, 2013a), under penalty of disasters such as Mariana/MG, in 2015, and Brumadinho/MG, in 2019, returning.

In order to study and avoid these episodes, one of the main ramifications of this new structure of law is *Disaster Law* , "founded on the central idea that the severity of these events requires regulation that is sensitive to risk and uncertainty" (CARVALHO, 2015, p. 21). Disasters – natural, industrial or hybrid – are not monocausal nor do they have a linear causal link. They need a transdisciplinary knowledge for their understanding, their management and their assimilation, being marked by the uncertainty of their probabilities, being systemic and, also, leading to contexts of irreversibility. Through Disaster Law, the Brazilian legal system is expected to respond to the situation of social complexity, with the development of adequate structures to deal with socio-environmental ills that demonstrate disrespect for the limits of nature being relevant (CARVALHO; DAMACENA, 2013b).

Confronting disasters is dealing with the consequences of adverse, unexpected events, which were caused by humanity (anthropogenic) or by nature itself (natural) in the face of an ecosystem, causing human, material and/or environmental damage. These injuries harm the economy and society (CASTRO, 1998).

Since the Enlightenment and Modernity, disasters have become notorious

in terms of the externalization of harmful events in the human evolutionary context, linked to the goal of "progress". This, of course, generated the necessary reflection on governance and the contributions of society and the Government to face them (CARVALHO; DAMACENA, 2013b).

Furthermore, it is necessary to differentiate the event from disasters, so that, when dealing with their origin, it will be possible to infer three types: natural, anthropogenic (human) and mixed. The first are caused by nature, and their generating factors act independently of human action – like hurricanes and earthquakes. On the other hand, the second are generated exclusively by human actions or omissions, such as "oil spill and explosion of an oil platform" (BERWIG, 2014, p. 141). Finally, mixed disasters occur when human conduct intensifies, complicates and/or aggravates natural disasters (CASTRO, 1998).

Disaster Law is a branch that allows analyzing governance in the context of catastrophic environmental events, showing the urgency of dealing with this matter by national and international doctrine (FARBER, CARVALHO, 2019). With this, the aim is to understand, predict and mitigate possible disasters and their consequences.

It is worth mentioning briefly some of its main features:

a) Multidisciplinarity, as its understanding requires joint work from different knowledge areas, such as law, meteorology, climatology, geology and risk management. Through the crossing of information and the contribution of these scientific areas, timely strategies are created for prevention, anticipation and management of future risks.
b) Unification with risk management, in which the phases of the disaster demonstrate that the responses to its mitigation, regarding the impacts produced, require that an appropriate management circle can unite assistance efforts in terms of responsibilities.
c) Its connection with the regulatory law, as it involves other fields that provide a glimpse of disasters, such as the failure of the legal system to effectively face risks (CARVALHO; DAMACENA, 2013b).

It is worth noting the existence of a doctrinal strand, in the environmental field, which teaches that natural disasters no longer consist of "events exclusively of nature", since human interference in the environment directly affects these occurrences. Disaster Law, which regulates the phases of the disaster management cycle (FREITAS, 2014), subdivides its entire study into two aspects: (1) prevention, aiming to avoid the occurrence of new disasters; and (2) compensation or mitigation, with the intent of mitigating the damage caused after the incident.

Although many focus on compensation, it alone is not enough, given that "the necessary conditions must be created to prevent the disaster and not just to repair it after it has erupted" (CASSALI, 2017, p. 114).

After all, environmental disasters are part of the emerging problem of a civilizing cultural crisis, as well as of modern rationality, of the economy coming from the globalized world, of the crisis of the effect of knowledge and its ultimate impacts on local and global aspects. Thus, there are new features, sometimes unpredictable, of the resulting environmental risks, which may even lead to cross-border consequences (CARVALHO; DAMACENA, 2013b).

Therefore, Disaster Law demands a "new rationality", articulated with political, governmental and social practices in the sustainable construction that values the resignification of nature for a new culture. Thus, the lack of legislative compliance in the environmental area becomes evident, with amplification of the harmful effects resulting from degradation. A projection of reductions in observed vulnerabilities is appreciated, as well as the formation of a new culture based on political and legal rationality that is preventive and effective (CARVALHO; DAMACENA, 2013b).

2 The Mariana/MG disaster and its main consequences

This topic seeks to analyze the consequences of the disasters in Mariana/MG, in 2015, in order to demonstrate, in a practical case, how the prevention and compensation fronts could have avoided, and better remedied, the problems once envisioned.

A country is shaped by historical moments that direct public policies to previously neglected topics. This is what happened, for example, with the United States, which, after the terrorist attacks suffered on September 11, 2001, reformulated its entire internal structure, with a view to improving the country's security, enacting laws such as the USA Patriot Act (2001-2015) and the USA Freedom Act (2015-current).

As for the environmental area discussed here, "the current debate on environmental policies, including the sustainability paradigm, requires the examination of issues that go beyond the margin of the normative framework, whether international, constitutional or administrative" (FAUTH; OLIVARES, 2022, p. 141).

In the Brazilian reality, the disaster in Mariana/MG, in 2015, must (without any doubts) be treated as an opportunity to remodel the Brazilian relationship

with the environment. Even if, at first, the Brumadinho/MG disaster itself, in 2019, demonstrates that little has been learned, it is still possible to consolidate previously ignored concepts.

According to Siqueira and Rezende (2022, p. 299), "the rupture of the mining tailings dam, called Fundão, owned by the mining company Samarco, in the municipality of Mariana in 2015, caused one of the biggest socio-environmental disasters in Brazilian history". In agreement with the authors, it was noticed that the answer to the problem of this case involved many successes and mistakes that were committed by the Brazilian legal system regarding the unfortunate tragedy in question. A lesson to be drawn is the urgency of valuing

> […] the improvement of state organicity, so that Environmental Civil Responsibility is imputed as a way of ensuring society an effective response to environmental tragedies, as exemplified by the case analyzed. On the other hand, it can be said that it is necessary to create an efficient mechanism to resolve technical conflicts and enable the participation of affected people in the repair procedure (SIQUEIRA; REZENDE, 2022, p. 314).

For this, it will be necessary, first, to understand that the discourse – that the whole problem began on the fateful afternoon of November 5, 2015 – may be wrong, given that it exonerates State and Samarco, controlled by BHP Biliton and Vale SA, from the guilt and from the duty to inspect and repair the defects present in the dam. Samarco's history with environmental agencies, according to a survey carried out by the PoEMAS Group (2015, p. 41), demonstrates constant flaws and defects:

> The first notice of violation in the system dates back to 1996 and refers to mineral extraction (with no further information available at SIAM). Subsequently, almost annually the mining company was notified of some irregularity by the state or federal environmental agency: in 1997, 1999, 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2010, 2011, 2013 and 2014.

These antecedents must be analyzed from the Brazilian legislative perspective, in which the supervisory bodies are precarious and unable to exercise effective control of dams. Thus, the possible assumptions about a much higher number of violations than registered would not be absurd (GOMES, 2017). However, it is possible to observe that, in a Rule of Environmental Law, these problems would be previously remedied. Questions like "Should a company with so many notifications be working?", would have negative answers.

Meanwhile, unlike what happens in the Environmental Rule of Law, the economic aspect, although important, would not overlap with the ecological one

when taking into account the enormous destructive power of which Samarco is the holder. Even if, in a hypothetical and absurd situation, Samarco's history were ignored, a simple assessment of how the work on the Fundão dam was being carried out would already attest to the defects. This is because it was identified, after the disaster, that Vale – one of Samarco's owners – had a contract with Samarco itself so that it would be possible to deposit, in all, 5% of mineral tailings in the Mariana dam. However, what happened in practice was a dumping of 28%. Furthermore, it was identified that the tailings came directly from pipes connected to Vale's Alegria mine (VALE JOGOU…, 2015).

In addition to the aforementioned violations, a document from the Public Ministry already indicated the existence of a risk of rupture in Mariana, taking into account that "contact between the tailings pile and the dam is not recommended because of the risk of destabilization of the dam massif pile and the potentialization of erosion processes" (HOUVE NEGLIGÊNCIA…, 2015). In addition, there was a recommendation from the State Foundation for the Environment (FEAM) highlighting the need for repairs to the structure of the Fundão dam (D'AGOSTINO, 2015).

Analyzing these issues, it is evident the indispensability of Disaster Law in its preventive bias, since the degree of impact in a given region depends directly on the preparation made to contain and mitigate the effects of possible complications (CARVALHO; DAMACENA, 2013a). With adequate planning, it would be possible to avoid all the consequences resulting from the irrefutable negligence and omission of the State and Samarco.

In this regard, Marques (2016) clarifies that prevention involves two phases: risk assessment and management. In the first, there is a general analysis, checking, for example, which areas are at greatest risk, which part of the system works most effectively and which does not. Risk management is concerned with two aspects, clarified by the Ministry of Regional Development (MDR, 2011): (1) the structural/physical aspects, notably the infrastructure built by human beings to avoid and mitigate possible consequences; and (2) the non-structural aspects, which encompass everything that would be connected to that undertaking, which benefits would be given to the population, and which environmental areas would be connected.

In this perspective, analyzing the specificities of the Mariana/MG disaster in 2015, it was possible to note the lack of an effective prevention phase, insofar as both risk assessment and risk management were, if not non-existent, flawed. Samarco did not adopt an effective and detailed emergency plan, but one that

was considered fragile by specialists, and which was not even put into practice. Moreover, there was no training at all times so that citizens would know how to react in the event of a dam failure (WERNECK, 2015).

It was as a result of already demonstrated negligence and omissions that, on November 5, 2015, the "Fundão" dam broke. Samarco, once again, demonstrated its inefficiency in dealing with the countless peculiarities involved in managing a dam. It should be noted that such damage would not have existed if the State had been efficient in its duty to supervise and punish the mining company's illicit practices. Thus, the blame for such a catastrophe falls on both subjects.

That said, over the course of 17 days, the approximately 50 million cubic meters of waste released with the disaster went over what they found on the way, taking with them 19 human lives, in addition to several other animal and plant lives. In its course, all the dense and thick mud passed through more than 40 cities in the states of Minas Gerais and Espírito Santo (ZUBA, 2016), having completely destroyed the municipalities of Bento Rodrigues and Paracatu de Baixo (GTSC A2030, 2019).

Data indicate that approximately 663.2 kilometers of rivers and streams were affected; around 11 tons of fish were killed (CÂMARA DOS DEPUTADOS, 2016); and about 26 species of fish present in the Doce River and countless others in the path of the mud wave became extinct (GTSC A2030, 2019). In the end, the tailings reached the Atlantic Ocean and brought with them large amounts of heavy metals, reducing marine organisms in the region (RELATÓRIO DETALHA…, 2017) and affecting the Abrolhos archipelago, a habitat for humpback whales located in southern Bahia (MOTA, 2017). The disastrous ecosystem imbalance was notorious, with broad socio-environmental consequences.

From a retrospective look, it was possible to see that Samarco sought to mitigate the damage caused by the disaster by building containment dikes, with the aim of stopping the mud. Still, to prevent the silting up of the rivers, it placed stones and geotextile blankets and planted grass (ALDAY, 2018). However, dykes quickly deteriorated, and the silting, even if reduced, continued to happen. As regards the attempt to prevent the mud from reaching the sea, there were two main methods: (a) the construction of a 9 km barrier, which was ineffective, given the use of inappropriate material (CAVALCANTI; AMÂNCIO, 2015); and (b) maintenance of channels located to the north, aiming to facilitate the flow of mud (BORGES, 2015). Both actions were powerless and allowed the mud to affect 392 km^2 of marine area (GALVÃO; LOVISI, 2019).

Later, expanding this vision, on June 30, 2016, the Renova Foundation was

created, a non-profit organization that sought to repair the damage caused by the Mariana/MG disaster. However, several criticisms fell on the institution, which "acts without transparency or dialogue with residents" (MACIEL, 2018), and, in 2016 and 2017, had its administrative services managed by Samarco itself.

About 20% of the institution's employees were formerly Samarco employees (MACIEL, 2018), which raised an important question: would the company that caused the damage have been the most qualified to manage a body that will repair it? History indicates no. After all, among several other problems, the institution also tried to suspend the emergency aid it paid to fishermen unable to work because of pollution in the waters affected by the disaster.

It is also pertinent to highlight, even briefly, the institute of responsibility in the environmental field. Article 225, § 3, of the CRFB provides for triple responsibility for the cause of environmental damage (BRASIL, 1988). This, in turn, means

> [...] that those causing the environmental damage will be charged with an administrative sanction, such as a fine, suspension of activities or embargo on works, and another criminal sanction, such as detention or imprisonment. All this without prejudice to the obligation to fully repair the damage, the environmental civil liability. The integral repair of the damage must be sought primarily through restoration or environmental recovery. Since it is not technically possible, only in this case is it possible to adopt compensatory measures, including pecuniary compensation (SIQUEIRA; REZENDE, 2022, p. 302).

In particular, being aware of its legal regulations, civil environmental liability is certainly "one of the most debated topics in Environmental Law, with a vast doctrinal production and various manifestations of our courts, especially the Superior Court of Justice" (SIQUEIRA; REZENDE, 2022, p. 303). Linking to this,

> Although for years the jurisprudence of the Superior Court of Justice and the Federal Supreme Court has consolidated a robust system of attributing Environmental Civil Liability to the degrader, with the adoption of the Integral Risk Theory, imprescriptibility and solidarity, the practical application of this legal system has not brought the expected efficiency. The analysis of past cases revealed that in environmental disasters that occurred in the remote past, repairing the damage suffered would still be far from becoming a reality. It was therefore necessary to create a new reparative model. The great merit of the entities was the inter-institutional articulation between the Federal Government, the State of Minas Gerais, the State of Espírito Santo and practically all the representative institutions of the Justice System: Federal Prosecution Office; Prosecution Offices of Minas Gerais and Espírito Santo, Federal Public Defender's office, Public Defenders' office of Minas Gerais and Espírito Santo. There are no precedents in Brazilian law for an agreement such as the

> one signed in this case, either by the involvement and articulation of all institutions, or by the amounts involved. The pioneering integration of the various bodies that make up the Justice System has demonstrated the enormous gain in efficiency in the results achieved (SIQUEIRA; REZENDE, 2022, p. 313-314).

This case demonstrates the legal evolution in the recognition of "integrative dignity", showing, therefore, that all lives must be recognized, respected and protected, as in the modern legal culture, whose primacy guarantees the due protection of all important values. Thus, the environment enjoys dignity, which must be respected (AYALA; SCHWENDLER, 2021).

Thus, the assertion that Samarco failed both in the preventive phase and in mitigating the damage caused is irrefutable, making it necessary, in order to protect both human beings and other animal and plant life, to rethink the current structure (so that similar scenarios do not happen again). As a proposal of this research, the establishment of an Environmental Rule of Law would prevent companies from acting outside the ideal parameters, regardless of their profit factor, preventing the occurrence of any disasters.

Conclusion

In this article, it was essential to address, initially, the evolution and conceptualization of the Rule of Environmental Law, later facilitating the differentiation between this and the Environmental Rule of Law. In this sense, it was identified that, although the latter is in force in Brazil, the first is the most able to comply with environmental guidelines, because it has important pillars that put the environment in the foreground, even in the face of advantageous economic/profitable benefits.

It was also clear that, since Disaster Law is one of the main branches of this new structure, the occurrence of disasters would be significantly reduced, since, in its prevention and mitigation phase, this branch deals with proposals that not only strive to attenuate/mitigate consequences, but also primarily seek to avoid them.

Lastly, a study of the disaster in Mariana/MG, in 2015, was carried out, with obvious flaws in both the preventive and mitigating aspects, as well as the impunity of those involved. With regard to prevention, it was widely known that nothing was done, even with the documents from the Public Prosecutor' Office and the State Foundation for the Environment, also indicating the possibility of a rupture in the Fundão dam. This was one of the worst environmental disasters in Brazilian history.

In addition to the above, Samarco, which had a history full of environmental violations, did not train the population for an emergency situation in case the dam breaks. Furthermore, it was evident that the company deposited more tailings in the dam than what was contractually foreseen. Its failures and hidden risks led to the catastrophic disaster on November 5, 2015, which resulted in the loss of 19 human lives, in addition to countless animal and plant lives, with disastrous ecosystem after effects.

In the mitigation aspect, things are not improving: the methods used by the mining company were ineffective, because the containment dikes, in order to stop the mud quickly, deteriorated. Moreover, there was silting up of rivers, even with the implementation of stones, geotextile blankets and grass. With regard to the creation of a foundation focused on repairing the damage caused, such as the Renova Foundation, it is surrounded by controversies and investigations that range from a lack of transparency to an administration mainly composed of former Samarco members/employees. Finally, in the face of all the problems described, it is clear that several human lives have been affected, with countless people losing their homes, their possessions, their families, their friends, their routine, their work and, above all, their lives.

It is in this aspect that each and every work that comes to study these cases must be prepared by thinking about the lives affected and the socio-environmental imbalance, which is why the establishment of the Rule of Environmental Law is essential. Samarco thereby would not continue operating before promoting a profound overhaul of its internal structure, in order to present concise plans for change and an ethical commitment to the environment. Valuing the fundamental right to an ecologically balanced environment permeates the state and social duty of its observance in favor of environmental protection for present and future generations.

Thus, the country's conjuncture must already recognize that nature and the lives derived from it are subjects of rights and dignity, deserving broad and effective protection. This is prominently observed by the Ecuadorian and Bolivian protective frameworks, constituting the Plurinational State, adopting the (Bolivian) *living well* and (Ecuadorian) *good living* models in the human-nature relationship, being present in the emerging ecocentric paradigm.

In this sense, the constitutions of Ecuador (2008) and Bolivia (2009) are great world examples in the recognition of nature as a subject of rights. May such lessons allow for timely critical reflections on the subject in question, promoting the importance of environmental protection and ecosystem resilience on a global scale.

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