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The *Brumadinho* Dam Rupture Disaster, Brazil 2019: Analysis of the Narratives about a Disaster from the Perspective of Disaster Law

O desastre da ruptura da barragem de Brumadinho, Brasil 2019: análise das narrativas sobre um desastre na perspectiva do Direito dos Desastres

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Resumo

Infelizmente, as falhas nas barragens de rejeitos com consequências catastróficas não são novidade em nosso país. No entanto, o Direito dos Desastres, um ramo da prática jurídica que destaca o papel do sistema jurídico na redução das vulnerabilidades subjacentes a esses eventos, ainda não é amplamente conhecida. O direito desempenha um papel central no gerenciamento de eventos catastróficos. Um desastre é o resultado de vulnerabilidades sociais e físicas. Nos desastres causados por atividades econômicas (desastres antropogênicos ou tecnológicos), há uma ênfase adicional na vulnerabilidade tecnológica como chave para identificar assimetrias e falhas no fluxo de informações fundamentais para a ocorrência do desastre. Com base nessas premissas e numa metodologia de reconstrução narrativa, este artigo visa esclarecer o papel da lei em eventos como esse, a fim de aprender com os ciclos destrutivos e impedir novos.

Palavras-chave: desastres antropogênicos, Brumadinho, vulnerabilidade tecnológica.

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Abstract

Tailings dam failures with catastrophic consequences are, unfortunately, nothing new in our country. And yet, Disaster Law, a branch of legal practice that highlights the role of the juridical system in reducing the underlying vulnerabilities of these events, is still not widely known. Law plays a central role in the management of catastrophic events. A disaster is the result of social and physical vulnerabilities. In disasters caused by economic activities (anthropogenic or technological disasters), there is an added emphasis on technological vulnerability as a key to identify asymmetries and failures in the flow of information fundamental for the occurrence of the disaster. Based on these premises and on a narrative reconstruction methodology, this article aims to clarify the role of law in events such as this, in order to learn from destructive cycles and prevent new ones.

Keywords: anthropogenic disasters; Brumadinho; technological vulnerability.

Introduction

According to the database *World Mine Tailings Failures* (2020a), there has been a growing trend for ruptures of large dams since 1990. While failures have decreased on the whole, the occurrence of large collapses has been increasing. According to this document, a total of 46 occurrences described as "serious" to "very serious" took place between 1998 and 2017. The study provides a disturbing prognosis: "without major changes to law and regulation, and to industry practices, and without new technology that substantially reduces risk and increases loss control, our current prediction is for 19 Very Serious Failures between 2018 and 2027."[2]

Regrettably, the disaster in Brumadinho is already factored into this terrible prognosis. Another study states that the main causes of tailings dam incidents are "lack of control of the water balance, lack of control of construction and a general lack of understanding of the features that control safe operations." One or two cases of unpredictable events were identified, in addition to other cases caused by unexpected climatic conditions or earthquakes, "although it can be argued that with today's knowledge, allowance should have been made for these events." (ICOLD/UNEP, 2001, p. 6)

This article, far from having the ambition of making absolute claims, intends to demonstrate how Disaster Law can be useful for the legal management of extreme events, while also providing some insight into the legal treatment of events marked by chaos and disorder. To this end, methodologically speaking, we will draw on narratives produced by the media. We have, of course, selected credible sources, as well as information that has mostly been published in various media outlets, a preliminary indication of trustworthiness and accuracy. In addition, we have chosen news items that are particularly important for the unfolding of this event. Narratives of catastrophes are nothing new, and some have had great historical, literary, media, political and also legal relevance.

While, on the one hand, these sources might be driven by a certain appeal of mass media for the spectacular, on the other hand, they present the public with relevant information that would hardly have come to light before a judicial decision, a process which would evidently

[2] Available at https://worldminetailingsfailures.org/?sfns=st Accessed on 02.02.2019.

take years. Out of the effervescence of information stemming from the collective grief and dismay, this article presents essential reflections informed by Disaster Law, with the sole purpose of providing legal rationality and stability to the chaos that a disaster such as this brings about, and thereby ensuring that legal work such as this may in some way reduce vulnerabilities and celebrate the resilience of communities in the future. Even if an averted disaster is not accounted for and will therefore always remain unknown, that will always be the ultimate goal of Disaster Law practitioners around the world.

The event

On January 25, 2019, the tailings dam of the Córrego do Feijão Mine collapsed at 12:28 p.m. It was operated by the mining company Mineradora Vale and located in the municipality of Brumadinho, in the state of Minas Gerais. The dam contained approximately 12 million cubic meters of iron ore tailings and had been inactive for approximately 3 years. It was licensed for decommissioning in 2018. It was a so-called upstream dam, the most frequently used construction methodology for tailings dams, but also the one with the highest number of accidents.

Most of the victims were company employees and outsourced workers who were either in the administrative building or at the company canteen, both of which were located directly on the pathway of the spill, less than a mile from the dam. That distance was covered in approximately two minutes. (Rossi, 2019b) Seventeen days after the event, the number of confirmed deaths stood at 165, with another 160 reported missing, 138 homeless and two casualties still hospitalized. (Souto, 2019)

In terms of environmental impacts, the area affected by the rupture of the dam covered 269,84 hectares. The preliminary analysis carried out by the National Center for Monitoring and Environmental Information (Cenima) from the federal environmental agency, IBAMA, "indicates that the mining waste has devastated 133,27 hectares of native vegetation of the Atlantic Forest and 70,65 hectares of Permanent Preservation Areas (PPA) along the waterways affected by the mining waste."[3] The waste has already traveled down 98 km of water resources (Rodrigues, 2019), obviously causing severe environmental impacts in them.

A similar disaster had occurred three years earlier. On November 5, 2015, what was known until then as "the worst environmental disaster in Brazil" (Phillips, 2016; Branco and Ponso, 2017) took place in the same mining region of Brazil. The Mariana disaster also resulted from the rupture of a tailings dam (called Fundão), although this one was used for the production of iron ore pellets and operated by Samarco (a company owned by two other mining companies, the Brazilian Vale and Anglo-Australian BHP Billiton). That rupture released about 60 million cubic meters of iron ore tailings into the Rio Doce, one of the most important rivers in the country, which in approximately two weeks reached the Atlantic Ocean. The destructive path of the slurry extended over 879 kilometers. Many cities were strongly impacted along its track, and the tailings caused extensive environmental damage, while also displacing 600 people and causing a human death toll of 19.[4] Another similarity between Mariana and Brumadinho: both were upstream tailings dams.

[3] Available at http://www.ibama.gov.br/noticias/730-2019/1881-rompimento-de-barragem-da-vale-em-brumadinho-mg-destruiu-269-84-hectares Accessed on 02.08.2019.

[4] For a more detailed approach to this case and the failures in risk management, see Carvalho (2019c, p. 281-300).

What sort of disaster is Brumadinho?

Disasters are classified[5] by triangulating factors such as (i) causes (physical[6], anthropogenic or mixed); ii) consequences (lives, properties and environment); iii) systemic stability (whether an emergency situation or a state of public calamity is declared, for instance). (Carvalho e Damacena, 2013) Failures of iron ore tailings dams, such as Mariana in 2015 and now Brumadinho (2019), clearly fall into the category of anthropogenic disasters, or events stemming directly from an economic activity or a human cause, a *man-made disaster*. In terms of consequences, such a disaster can be classified as a socio-environmental disaster, given the loss of lives and significant environmental impacts. The normative principle adopted in Brazil is based on Decree 7.257/10, which, in item II, of article 2, characterizes such a disaster as a "result of adverse natural or man-made events on a vulnerable ecosystem, causing human, material or environmental damage and consequent economic and social loss."

As we have said before, given their intensity, disasters are phenomena with severe associated consequences that also prevent – either partially or completely – the affected community from reacting to and responding to their impact. The attribute 'environmental' added to the term disaster is directly related to the severity of an event for the environment. In the case of Brumadinho, the disaster is undeniably anthropogenic in terms of its cause, and socio-environmental in terms of its consequences.

Technological vulnerability

For centuries, disasters were treated as events resulting from divine fury, and as such evidently beyond the control of society and, consequently, beyond the scope of law. Today, however, informed by insights from the *Social Theory of Disasters*, they are more properly seen as social, or at most hybrid, or physical ("natural") phenomena. Hence, for a given event to have the dimension of a disaster, there will often be some social factors that contribute to its occurrence or aggravation. In disasters, these underlying factors are the vulnerability and resilience of a given community. The vulnerabilities that pervade disasters can be physical or social. (Farber *et al*., 2010; Verchick, 2010b; Verchick, 2012c; Verchick, 2019a)

Anthropogenic disasters are more often associated to social vulnerabilities, more specifically the type of vulnerability we have come to call *technological vulnerability*. This category is directly related to breakdowns and communication gaps in the flow of information. In other words, anthropogenic disasters are strongly correlated to problems in the exchange of information or knowledge that function as preponderant factors in causing or escalating such events. Such problems interfere with the diagnosis of risks and consequently impair the adoption of preventive and mitigating measures, or adequate safety precautions after the onset of the event. These information flows are basic prerequisites for any risk management process and for taking preventive or precautionary measures.

For this reason, the environmental licensing process is the appropriate administrative procedure for the environmental risk assessment and management (Carvalho, 2015a, p. 65-78) of these structures, which should include a series of documents, such as the Dam Safety Plan (Article 6, II, Law 12.334/2010), and, if applicable, the EIA/RIMA (Environmental Impact

[5] For a more detailed approach on developing a legal sense of disaster, see Farber *et al.,* 2010 and Sugerman (2006, p. 01-09).
[6] Physical disasters are often referred to as "natural", but here we prefer this term, because even climatic and physical disasters can have some human contribution, even if indirectly and of complex causality. In this sense, we can talk about extreme climate events that are aggravated by anthropogenic climate change. In order to avoid longer digressions and the complexity of this debate here, we have opted for this conceptual designation.

Assessment) for activities with the potential for causing significant environmental degradation. The Dam Safety Plan is an instrument from the National Policy on Dam Safety, and Article 8 of that legislation lays out the minimum information it should contain. Among the requirements, there is the need for periodic safety inspections (IX), for example.

The frequency of these inspections, as well as the qualification of the technician in charge, the minimum content and the detail level of the safety plans are to be set by the *inspection agency* (paragraph one), which in the case of iron ore tailings dams is the National Mining Agency – ANM, the same body that grants the permits for final or temporary disposal of tailings.[7] However, that responsibility does not in any way preclude further inspections conducted by agencies that are part of *Sisnama - Sistema Nacional de Meio Ambiente* (National Environmental System).[8]

In addition, it should be pointed out that it is the inspection agents who classify a tailings dam in terms of risks, taking into account the probability of occurrence (the risk category of the dam) and expected magnitude (potential associated damage and extent).[9] For the Córrego do Feijão dam, the potential for an accident was considered low risk (probability), but any accident would have a high potential associated damage (magnitude). (Saconi and Ventura, 2019)

Inspectors are also responsible for deciding on whether or not to call for an emergency plan (also called a contingency plan).[10] This plan has a dual role: plan responses to the event in order to mitigate its consequences and, by means of advance analysis of the event, allow preventive measures to be adopted so as to avert the event or reduce its likelihood.[11] The minimum standard of care required in contingency plans refers to rationally predictable risks (relating to construction, design, operation, procedures, etc.), which the plans must anticipate in order to prevent and mitigate failures and consequences. These plans are directly linked to the concept of *professional standard of care*, that is, the standard adopted as the state-of-the-art of a given field of expertise. (Binder, 2002, p. 806)

An emergency or contingency plan should also be seen as an essential instrument for any municipality that might be affected, or by any private enterprise engaged in activities of exponential magnitude. Contingency plans should also be developed by courts and government agencies to provide them with a guiding framework by which to take organized and effective action to mitigate and respond to catastrophic events (and their resulting avalanche of litigations).

One way to demonstrate technological vulnerability is to determine whether there are breakdowns or communication gaps in the flow of information, especially with regard to predictable risks.[12] One such example would be discrepancies in the procedures specified by different documents that evaluate and authorize a given project, such as the environmental permit, the dam safety plan, the emergency plan and the periodic reviews. One of the purposes of these instruments is precisely to provide for the adequate flow of information inherent to the safety of these structures. Communication breakdowns and lack of precision increase the vulnerability of structures facing disasters. In other words, a permit or approvals that do not reflect the warnings and measures contained and recommended by the

[7] According to article 5, III, from Law 12.334/2010.
[8] Article 5, caput, from Law 12.334/2010.
[9] Article 7 from Law 12.334/2010.
[10] As set out in article 8, VII, Law 12.334/2010.
[11] On Contingency Plans, see Carvalho (2019c, p. 294-299).
[12] For a distinction between quantifiable and non-quantifiable risks, see Knight (1921), Sterling and Gee (2002, p. 521-533), and Carvalho (2017b, p. 176-208).

instruments that specifically contemplate a disaster scenario (e.g., a dam safety plan, an emergency plan, the periodic reviews) will inevitably be a recipe for disasters.

Another example can be found in the track record of accidents involving iron ore tailings dams. According to previous case studies, regular periodic inspections and close monitoring are essential for the safety of such structures. However, in spite of being apparently effective, inspections can prove quite inadequate. As reported in a documented reviewing many such accidents: "Unless the inspector has a good knowledge of the behavior of tailings dams and has at his disposal instrumentation to reveal to him the conditions within the body of the dam and its foundations, such inspection may be not only useless but also highly dangerous by giving to management a false sense of security."[13]

Therefore, reducing vulnerabilities becomes a key role for law in dealing with catastrophic risk events. It is the legal system that must answer the right questions and decide what information is to be produced; who is entitled to the information inherent to such situations; who is responsible for producing such information; what legal measures have to be taken on the basis of the existing information.[14] Reducing technological vulnerabilities is thus directly related to the production and transmission of adequate information to allow for efficient risk management, supervision by the competent bodies and appropriate emergency responses. Accurate information also allows for more technically appropriate decision making, both in the public and private sectors, as well as greater mobilization of potential stakeholders. Risk management is crucially dependent on the existence of adequate information. The same applies to the adequacy of emergency responses, compensation arrangements and, ultimately, to the reconstruction of the environment and the affected community itself.

In the Córrego do Feijão dam failure (B1), in addition to the physical vulnerabilities that were made evident by the rupture itself, other aspects contributed to the disaster: not only were there social vulnerabilities, such as the technological vulnerabilities already addressed above, but also a *workplace vulnerability* which placed the company's employees directly in the path of the catastrophe. And as if that were not enough, the city's urban planning – the very instrument used for zoning and implementing urban policies – allowed for urban expansion and development along the path which the mining waste slurry would eventually take.

The circularity of risk and increased risk awareness

I. Prevention and Mitigation: Disaster law is closely related to risk management. In view of the magnitude of these events, the saying "better safe than sorry" is at the core of this legal branch. The reason lies precisely in the magnitude of the risks involved. Even when the likelihood of a disaster is low, as was indicated by the technical documents for the Brumadinho dam, its ranking as a high magnitude event should always generate a detailed process for managing the associated risks. Disaster law identifies its structures and roles within the framework of the disaster cycle, i.e.: prevention and mitigation; emergency response; compensation to victims and the environment; reconstruction of the affected community and environment (green and grey infrastructure). All of these are intertwined in a

[13] This was the case with the accident at the Placer Bay mine in Surigao del Norte, Philippines. This was a deactivated mine that breached when mining waste rocks were being dumped onto the inactive tailings for which the dam had originally been built. (ICOLD/UNEP, 2001)

[14] For a discussion on the "right to know" and environmental disasters, see generally Jassanof (1994).

circular pattern by the necessary risk management implemented at each of these stages. (Farber et al., 2010; Farber, 2012b)[15]

It should be underscored that since an ore tailings dam is a structure with potential for large-scale damage, its management should follow the logic demonstrated above, with an emphasis on circular risk management at all stages of the event. As is well known, the "[f]ailure of the retaining dam can release liquefied tailings that can travel for great distances, destroying everything in its path because of its greater weight. Water will flow through and around buildings, but liquefied tailings can destroy the structures." (ICOLD/UNEP, 2001, p. 12)

Any risk management process involves evaluating and multiplying the factors of probability (the quantification of the likelihood of a given event) and magnitude (the severity of its potential impacts). Law 12.334/10, which outlines the national policy on dam safety, makes reference to these elements by means of the concepts "risk category", for probability, and "potential damage associated with the dam", for magnitude (article 7). Both can be classified into low, medium and high potential. The degree of likelihood will depend on technical characteristics, the structure's state of conservation and its compliance with the dam safety plan (paragraph one), while the classification into a category of potential damage associated with the dam is made according to the extent of potential loss of human life, as well as the economic, social and environmental impacts resulting from the dam's collapse (paragraph two).

For a dam, the evaluation of probability refers to the quantitative analysis of its potential for structural failure. In the case of the dam in Brumadinho, as reported in the press, the probability was considered low. For an accurate technical analysis, the dam structures must meet the stability factors specified in technical standards. As well-observed by legal commentators, the national policy on dam safety places great emphasis on the principle of prevention (known and foreseeable risks)[16], without necessarily excluding the evaluation of uncertain or non-quantifiable risks (as foreseen in the National Policy of Protection and Civil Defense, Law 12.608/12).[17] Clearly, foreseeable risks must necessarily be addressed effectively and by means of reasonable measures in order to prevent catastrophic damage from occurring. The risks posed by the present case clearly appear to be quantifiable (or predictable by the state-of-the-art). However, even non-quantifiable and uncertain risks with potential for catastrophic or irreversible impacts call for decisions with an "adequate safety margin". (Sunstein, 2005)

This should apply even in such cases where the probability is extremely low or cannot be demonstrated in a quantifiable way. Thus, "[w]hen risks have extremely bad worst-case scenarios, it makes sense to pay special attention to those risks, even if they are unlikely to come to fruition and even if existing information does not enable regulators to make a reliable judgment about the probability that they will occur." (Sunstein, 2005, p. 04-05)

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[15] For a different take on the circularity of disasters, see Verchick (2012c) and Verchick (2019a, p. 59-106).

[16] As André Toledo, José Cláudio Junqueira and Romeu Thomé point out: "Law 12.334/2010, in turn, presents the incentive of the culture of dam safety and risk management as one of the principles of the National Policy on Dam Safety (article 3, VII). Risk management, here, is understood as the implementation of actions of a normative nature, as well as the application of measures for the prevention, control and mitigation of risks (article 2, VI). Aware of the dangers involved in the use of such structures, the national legislator has made clear the intention of encouraging the implementation of techniques and measures aimed at averting or, at least, minimizing the negative impacts arising from the use of tailings dams." (Toledo *et al.,* 2016, p. 80)

[17] According to article 2 from Law 12.608/12: "It is the duty of the Federal Government, the States, the Federal District and the Municipalities to adopt the measures necessary to reduce the risks of disaster. §1. The measures provided for in the caput may be adopted by public or private entities and by society in general. §2. *Uncertainty regarding the risk of disaster shall not constitute an obstacle to adopting preventive and mitigating measures for the risk situation."* (Emphasis added). (Brasil, 2012b)

As regards magnitude, any evaluation process and subsequent risk management must consider the potential consequences. In the case of Brumadinho, the tailings dam held 12 million cubic meters of iron ore tailings. Without going into the issue of evaluating potential risks of increasing imprecision or uncertainty in our specific case, those risks that are foreseeable or quantifiable must necessarily be subject to reasonable and satisfactory measures to avert serious losses. The goal should be to prevent or at least mitigate them. In this sense, what immediately strikes the observer is the fact that the company's own facilities were located directly within the impact area of a dam failure. An administrative building (including the staff tasked with activating the emergency plan) and the company canteen, both of which located just below the dam, draw attention to a noticeable lack of predictable (quantifiable) risk management. Consequently, regardless of the formal existence of an environmental permit, a dam safety plan and an emergency plan, not one of these instruments was able to generate awareness for the imminent risk of those structures. The same diagnosis was made after an analysis of the Fundão dam rupture in Mariana in 2015. (Carvalho, 2019c, p. 299-300)

In addition, it is worth noting that the scenarios outlined both in the emergency plans and the risk assessment were not enough to prevent urban development in the area that would be affected by the dam tailings in the event of a rupture. Again, these are foreseeable risks and should be addressed in order to avoid or at least mitigate the risks of "potential associated damage".

II. Emergency Response: Some observations are fundamental in relation to the necessary risk management that should inform the emergency response stage, which consists of *preparedness* (drafting contingency plans and training the people potentially involved) and the *actual response*.

The warning stage, in which a descriptive statement of the event is made (where possible before it takes place, so that the population and the organizations can take appropriate countermeasures), should be followed by the *emergency response plan* to the disaster. This is when the actions foreseen in the preparedness stage are carried out, through coordinated integration of the competent agencies and the enactment of the emergency and contingency plans. (Carvalho, 2015a, p. 116-121)

Narratives of the disaster corroborate that capacity building processes and simulations were periodically conducted. (Rossi, 2019b) However, even when it proves impossible to prevent a disaster, an obvious measure to mitigate its magnitude (potential associated damage) is to clear employees and the community at large from the impact zone and the path that the tailings slurry will take. Yet company employees were only 1.4 kilometers away and were hit within approximately 2 minutes of the breach.

Furthermore, the emergency plan, which is essential for mitigating any disaster, was not implemented immediately, as the personnel responsible for this task (initiate protocols and notify the authorities) was inside the administrative building on the very path of the slurry. Given that the emergency plan is designed in advance for the event of a failure, how was it possible that those responsible for its deployment were in the immediate impact zone? To make matters worse, the alarm system was knocked out so quickly that it was not even activated to warn the residents of the local community of Brumadinho. (Rossi, 2019a)

The declaration of a state of calamity or an emergency situation serves both to trigger and speed up the allocation of resources, while reducing bureaucracy for a series of measures and decisions. The transfer of funds depends on the declaration and recognition by the federal

government of an *emergency situation*[18] or a *state of public calamity*[19]. Formal recognition of the disaster by the federal executive branch, for the purposes of fund transfers and assistance from SINPDEC (formed by federal civil defense agencies and entities, along with participating civil defense agencies and entities from state and municipal governments), depends on the submission of a request from the executive branch of the state, federal district or municipality affected by the disaster[20].

Not only did the prevention of the disasters fail, but also the emergency response measures that could have mitigated them. The scrutiny of the rule of law must now proceed to determine the existence of liabilities (administrative, civil and criminal).

III. Compensatory and Reconstruction Stage: Disaster compensation is a further step towards increasing the resilience of victims, whether in financial or structural terms. In addition to this more traditional role, this stage also lends itself to the management of risks, to making decisions about who will be compensated, how much compensation will be paid, what accessory measures will be adopted to avert new disasters, among other tasks. There are four methods of compensation for catastrophic events: private insurance; legal remedies (in particular, civil liability); government assistance; previously existing legal funds, or such set up on an ad hoc basis.

Regardless of future claims for civil liability compensation, the company announced a registration process for an emergency payment of BRL 100,000 (about USD 25,000) per deceased or missing family member to their respective family (Stochero, 2019); BRL 50,000 for people who had property in the affected area; and BRL 15,000 for local retail workers. These amounts are cumulative. Funeral expenses were covered. The Municipality of Brumadinho was paid BRL 80 million as compensation for lost revenue due to the suspension of the company's activities. (Rodrigues, 2019)

These amounts will, of course, be deducted from possible civil liability rulings made against the company. It should be remembered that in the Brazilian legal system, in cases of anthropogenic disasters with socio-environmental repercussions, strict liability applies (article 14, paragraph one, law 6.938/81), with doctrine and court precedents largely ruling for the theory of integral risk (which does not admit any exculpatory defenses).[21]

The federal government has authorized advance withdrawals for beneficiaries of cash transfer programs (Bolsa Familia). In addition, affected homeowners will be eligible to make withdrawals from their FGTS employee severance guarantee funds, “due to personal need, the urgency and seriousness of which arises from a natural disaster”, even though this event is evidently not a “natural” disaster.

However, Federal Decree 8.572/2015, specifically edited after the Mariana disaster (2015), included among the situations in which amounts could be withdrawn from that fund the following cases: “rupture or collapse of dams that cause massive movement, with damage to residential units”. This normative act altered the text of the already existing decree 5.113/2004 that regulated the matter, and also established a ceiling of BRL 6.220 for such

[18] According to article 2, III, decree 7.257/10, an “emergency situation [is an] abnormal situation caused by disasters and resulting in damage and losses that entail partial impairment of responsiveness by public authorities in the affected area.” (Brasil, 2010a).

[19] According to article 2, IV, decree 7.257/10, a “state of public calamity [is an] abnormal situation caused by disasters and resulting in damage and losses that entail substantial impairment of responsiveness by public authorities in the affected area.” (Brasil, 2010a)

[20] According to article 7, decree 7.257/10.

[21] For a more detailed analysis of civil liability in cases of environmental disasters involving both the private and public sector, see Farber (2009a). For a comparative legal analysis, see Carvalho, 2015a (p. 131-176).

withdrawals. Despite the technical inappropriateness of equating the failure of the dam with a natural disaster, this was made solely for the purpose of allowing the immediate release of funds for the victims. Naturally, the decree does not have the normative force, nor even the purpose of reclassifying or changing the configuration of a type of disaster, in this case, resulting from the collapse of a dam. This, as we have seen, is a technological or anthropogenic disaster. It should be noted that in the case of amounts for which an employee holds title, they are to be reimbursed by those who are eventually held accountable for the event in terms of civil liability.

The reconstruction stage, on the other hand, should not be directed towards reestablishing the *old normality* (which existed prior to the event), forever unattainable in light of the irreversibility and magnitude of a disaster, but rather to a *new normality,* by reducing that community's vulnerability and increasing its resilience.

Final considerations: the closing of the cycle

Employing an interdisciplinary legal approach (with contributions in particular from Environmental, Urban Planning, Administrative, Criminal, Civil, Insurance and Contracts Law), Disaster Law seeks to address all stages of a catastrophic event. It should be highlighted that the autonomy of this legal branch is consolidated by a cycle of risk management that connects the stages from prevention through to reconstruction. From a legal perspective, in Brazil the autonomy and unity of this branch is characterized by a specific normative framework, centralized in Laws 12.340/2010 and 12.608/2012, as well as in Decree 7.257/2010. (Carvalho, 2015a, p. 51-52)

Therefore, in a disaster situation, or when facing a potential disaster, law serves the purpose of providing stability by enforcing normative standards prior to and following the event, without overlooking the destructive dynamics of a catastrophe. Law plays a role in the colonization of disasters.[22] According to Austin Sarat, law must deal with disasters along five dimensions, namely: *(i)* maintaining the operability of law, *(ii)* fighting lawlessness, *(iii)* providing stabilisation and resettlement to the victims, *(iv)* identifying victims and culprits; *(v)* reducing future vulnerability. (Sarat and Lezaun, 2009, p. 7)

The occurrence of a disaster should initiate a new learning cycle where measures are taken to prevent future and potential disasters. To this end, a systemic assessment must be carried out to identify what the points of failure were (structural, regulatory, third parties, physical factors, etc.) and which preventive measures are to be incorporated into future events. There is an important difference between misfortune and injustice. Misfortune implies complacency and resignation, whereas injustice calls for legal liability. It goes without saying, always based on due legal process and the rule of law.

What remains after a disaster is to restore essential public services, compensate victims and environmental impacts, seek accountability and, most importantly, learn (and take measures) to prevent the recurrence of such events. If this is done, the cycle closes successfully, averting further similar events. Otherwise, new disasters are sure to follow.

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