

BALANCED WORKING ENVIRONMENT: ANALYSIS OF THE BRUMADINHO CASE¹

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ABSTRACT

Considering the general understanding of the legal-environmental system and its applications to Labor Law, this article discusses the ineffectiveness of the principles that guide Environmental Law – with emphasis on principles of prevention, precaution, continuous improvement, participation and polluter pays – that helps trigger major occupational accidents. Especially in relation to the tragedy of Brumadinho (Brazil, Minas Gerais, January 25, 2019), how would the correct understanding and application of environmental legal principles contribute to avoiding the accident or mitigating its effects? In order to answer this question, using the deductive and dialectical methods and starting from careful bibliographical-documentary research, this paper examines (i) the concept of the working environment; (ii) the applicability of the principles of prevention, precaution, continuous improvement, information, participation and polluter pays, which guide Environmental Law, extending its applicability to Environmental Labor Law; (iii) the “Brumadinho case”, considered to be one of the largest work

¹ The authors dedicate this article to the families of the victims of Brumadinho/MG, who – despite the efforts of the authorities, those involved and others – still suffer bitterly, to a large extent, in dismal helplessness.

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accidents in the world and the largest in Brazil, assessing whether the actual ineffectiveness of those principles contributed to the harmful event; and (iv) what the probable diagnosis of the employer's civil liability for the imbalance of the working environment is.

Keywords: Brumadinho case; employer's civil liability; environmental labor law; occupational accidents; work environment.

*MEIO AMBIENTE LABORAL EQUILIBRADO:
ANÁLISE DO CASO BRUMADINHO*

RESUMO

Partindo da compreensão geral do sistema jurídico-ambiental e de suas aplicações ao Direito do Trabalho, este artigo discorre sobre a inefetividade dos princípios que orientam o Direito Ambiental – com destaque para os princípios da prevenção, da precaução, da melhoria contínua, da informação, da participação e do poluidor-pagador – concorrendo para a deflagração dos grandes acidentes de trabalho. Notadamente em relação à tragédia de Brumadinho (Brasil, Minas Gerais, 25/01/2019), como a correta compreensão e aplicação dos princípios jurídicos ambientais contribuiria para evitar o acidente ou minorar os seus efeitos? Para tanto, valendo-se dos métodos dedutivo e dialético e partindo de cuidada pesquisa bibliográfico-documental, o estudo examina (i) o conceito de meio ambiente do trabalho; (ii) a aplicabilidade dos princípios da prevenção, precaução, melhoria contínua, informação, participação e poluidor-pagador, norteadores do Direito Ambiental, ao Direito Ambiental do Trabalho; (iii) o “caso Brumadinho”, considerado um dos maiores acidentes do trabalho do mundo e o maior do Brasil, avaliando em que medida a inefetividade concreta daqueles princípios contribuiu para o evento danoso; e (iv) qual a diagnose provável da responsabilidade civil do empregador responsável pelo desequilíbrio do meio ambiente do trabalho.

Palavras-chave: acidente de trabalho; caso Brumadinho; direito ambiental do trabalho; Meio ambiente do trabalho; responsabilidade civil do empregador.

FOREWORD

Taking care of the work environment and the health and safety of those who are there is a necessary task especially vested in businesspeople – we will go so far as to say it is an *ancillary duty* of individual employment contracts⁴ – especially when the economic activity developed has the potential for major occupational accidents, such as the disaster caused by the breach of the dam belonging to mining company Vale S/A in the town of Brumadinho (MG) on January 25, 2019; or, before that, the Mariana (MG) disaster on November 5, 2015, involving BHP Billiton and Vale S/A itself.

Brumadinho's case, however, became paradigmatic. It is now considered the largest occupational accident in the history of Brazil, with about 240 people killed, including over 130 direct or indirect (outsourced) workers of mining company Vale S/A; and, in a comparison on the international level, Brumadinho is perhaps the second largest industrial disaster of the 21st century, behind only the building collapse in Savar, on the outskirts of Dhaka (Bangladesh), where eight floors occupied by several plants and a shopping mall fell apart, taking the lives of 1,127 people (not by chance, incidentally, also a disaster related to the exploitation of human labor) (NORTH, 2013).

Brumadinho is not, therefore, an isolated case. Many other disasters in Brazil and around the world have received the attention of newspapers and experts, including major industrial accidents, such as the episodes of Mariana and Savar themselves, as well as the disasters of Jesse (Nigeria, 1998), Chernobyl (Ukraine, 1986), Bhopal (India, 1984) – the largest of all, with more than 20,000 deaths – San Juan Ixhuatepec (Mexico, 1984), Cubatão (Brazil, 1984), Kyushu (Japan, 1963), Shanxi and Benxi (China, 1960 and 1942), Oppau (Germany, 1952) and Gauley Bridge (United States, 1927-1931). All these cases have in common the characteristic features of *great magnitude*, *multiple fatalities* and *systemic causality* related to environmental degradation scenarios (including of the work environment, in the wake of what, in Brazil, is determined by Article 200), VIII, of the Constitution of the Republic of Brazil).

It is in this scenario, and especially from the details of the Brumadinho case, that we will discuss, along the following lines, how the informing

⁴ Or, according to Miranda (2012), *inept determination* of the legal business (with the difference that, in the case of an *inept duty*, the determination does not depend on the parties expressly stating their will through contract provisions).

principles of Environmental Labor Law apply – or should apply – to cases of this nature, and how to configure, in such contexts, the civil liability of employers in major accidents.

Therefore, based on bibliographical research, this text was organized into four major parts: (i) the first part discusses the work environment based on an essentially propaedeutic approach, seeking to clarify the concept of work environment that we adopt; (ii) in the second part, this paper deals with the legal principles that will guide the study; (iii) in the third part, the Brumadinho case is more directly analyzed; and (iv) in the fourth part, the civil liability of employers in cases of labor-environmental imbalance (and, notably, of major industrial accidents) is analyzed.

So, to the analysis proper.

1 WORK ENVIRONMENT: A CONCEPTUAL APPROACH

Workers' health and safety, their study and legal treatment, are often reduced to petty discussions about hazardous and dangerous work.

Far beyond such monetization, however, the protection of the work environment – and hence the health and safety of workers – involves broader and more systemic approaches that promote occupational health in all areas and avoid the actualization of any risk, be they physical (e.g. noise, vibration, extreme temperatures, abnormal pressures, ionizing and non-ionizing radiation etc.), chemical (e.g. dust, mists, fumes, gases and vapors etc.), biological (e.g. bacteria, fungi, parasitic worms, protozoa and viruses, etc.), ergonomic (e.g. physical exertion, weight lifting, improper posture etc.) or psychosocial (e.g. harassment, enforcement, excessive control of goals, etc.).

It is already considered as settled that labor-environmental issues are complex and multifactorial, and therefore must be understood from a “gestalt” perspective (neologism based on the German word “*Gestalt*”, which we have used to designate a type of holistic understanding whose first recorded instance acknowledged the totality, only then to look at, isolate, and understand its parts). Drawing from this understanding, we proceed to profile what is meant by work environment, as an assumption for subsequent analyzes.

Very well. Defining “work environment” is not a simple task, as it is a broad concept that is constantly being constructed. Thus, in this topic, we will draw some conceptual guidelines that make up and orient the notion

of work environment that will certainly and progressively evolve with the advancement of technologies and science, including legal science.

Ab initio, it is important to note that the work environment is part of the *general* environment, so that its concepts are intrinsically correlated. Thus, in order to understand the former it is necessary, first, to assimilate the concept of the latter.

According to the legal definition given by the law that established the National Environmental Policy (Law 6,938, of August 31, 1981), environment is understood as “the set of conditions, laws, influences, and interactions of a physical, chemical and biological nature” that allow for, shelter, and govern life in all its forms”. However, we can see that this normative provision (i) does not express the gestalt nature of the environment, since it defines it as a set, that is, as a sum of elements, and not as a system, a category that presupposes a necessary relationship of interdependence and interconnection between coexisting elements; (ii) does not include psychosocial interactions that interfere with the environment in its base concept. For these reasons, we think it is necessary to complement this legal definition by making it more holistic and appropriate to the characteristics of the environment.

Thus, the environment can be understood as a system of interacting elements that surround and shelter all life forms, including human life, impacting and being impacted by them (which, incidentally, are integral parts of that system). Derani (2008) sums up, from an anthropocentric outlook, the “*entourage* of the subject”, that is, their vital surroundings, what surrounds them, the environment where they find themselves. As such a view is centered on human life, it would not be possible to exclude the working environment from its scope. There is, in this light,

[...] an ontological inseparability between the natural environment and the human environment, so that the environment – both as a concept and an entity – can be understood as “*Gestalt*”, now in a philosophical sense (meaning that the interpretation of the object modifies or conditions the experience with the object). Here, in a phenomenal sense, the environment should not be taken as a sum of elements to be isolated, analyzed and dissected, but rather as a system consisting of autonomous units, manifesting an internal solidarity and having its own laws, resulting in the way each element exists depends on the structure of the whole and the laws that govern it, and none of the elements can exist before the whole (FELICIANO, 2002, p. 3).

The environment, therefore, involves not only the natural, artificial and cultural aspects, but also its labor aspect, as provided by art. 200, VIII, of

the Federal Constitution, the labor-environmental aspect being highlighted in the Constitution.

Moreover, it is important to stress that the work environment is not just about the workplace. In addition to the company's – spatial and material – walls, the work environment also encompasses the “work tools themselves, and the way tasks are performed” (MARANHÃO, 2017, p. 27), the organizational climate, the mode of payment, the way the employee is treated by the employer and his or her peers (MELO, 2013), among many other factors – physical, chemical, biological, ergonomic, and psychosocial – that influence their work life.

With the intense and rapid changes that occur in the world of labor, this “outside-the-walls” aspect is gaining more and more prominence, showing that the work environment is not restricted to the employer's physical premises and can project itself onto other spaces, such as the worker's residence itself (as is the case with those who work remotely at home, in a home office), in segments of the natural or artificial environment (such as the work environment, for example, of rubber tappers or truck drivers, which get mixed up, respectively, with the jungle and the highway), or even in the virtual environment (thus, for example, with some “infoproletarians” (FELICIANO; URIAS; MARANHÃO, 2017).

For this reason, it is convenient to conceive the work environment as the system of conditions, laws, influences and physical, chemical, biological and psychosocial interactions that affect man in his work activity – which inaugurates an essentially functional (rather than geographical or spatial) notion – whether or not it is subject to the hierarchical power of others (because, as it is a fundamental third aspect right, its consequences are not limited to the legal heritage of subordinate workers, although they are especially important in this case, given the natural vulnerability derived from contractual and economic asymmetry). A simple concept, well-grounded in current legislation and above all, an efficient concept.

Finally, it is certain that, as it is part of the general environment, the work environment must be protected with the same emphasis and instruments; its balance, which is essential to people's quality of life, must be preserved and promoted, as provided for in domestic and international standards of maximum importance (see, for example, Arts. 7, XXII, and 225, heading and § 3 of the Federal Constitution; art. 18 of the Mercosur Socio-Labor Convention; Convention 155 of the International Labor Organization; art. 12 of the International Covenant on Economic, Social

and Cultural Rights; and so on). Here, the inexorable interdependence of fundamental human rights is disclosed, as it is “impossible to achieve quality of life without quality of work, nor can a balanced and sustainable environment be achieved by ignoring the work environment” (OLIVEIRA, 1998, p. 78-79).

2 ENVIRONMENTAL LABOR LAW AND ITS GUIDING PRINCIPLES

Environmental Labor Law, a branch simultaneously affected by Environmental Law (in its transversality) and Labor Law (in its pluricentrality), is guided by the same legal principles that orient the protection of the “*lato sensu*” environment. Thus, the following are founding principles of Environmental Labor Law (we do not intend to exclude others that are frequently dealt with in law theory, but which we will not talk about here now, such as the principle of sustainable development or the principle of ubiquity): (i) the principle of prevention; (ii) the precautionary principle; (iii) the principle of continuous improvement; (iv) the principle of information-participation; and finally (v) the polluter pays principle.

Such principles – especially these – when interpreted in a combined and systematic way, will provide unity to the legal model of protection of the work environment, confirming the central need for the work-environmental problem to be treated from a preventive/precautionary standing, seeking, firstly, to eliminate or neutralize the risks (whether physical, chemical, biological or psychosocial) present in the work environment, including through collective protection equipment or humanized management techniques. Secondly, when the elimination or neutralization of risks is not feasible, it will be necessary to reduce them to the lowest possible level by incorporating the use of personal protective equipment, which no longer acts on the source of risk, but on the body of the worker (see NR 6). And finally, thirdly, when the restriction efforts described above fail, or if they are not economically feasible or legally reasonable, monetization will be attempted, but relegated to strictly exceptional situations.

Let us once again talk about each of them.

2.1 The principle of prevention and the precautionary principle

The principles of prevention and precaution, while similar and commonly taken as synonyms, are technically not equivalent.

The principle of prevention underpinned the Stockholm Declaration (1972)⁵ and presupposes the public, private and diffuse duty – thus extending to all, whether public or private players – of avoiding the actualization of known, scientifically proven, and potentially harmful risks to the environment, thus preventing “the occurrence of attacks to the environment by means of appropriate, so-called preventive, means” (PRIEUR, 2001, p. 306).

In another vein, and with a different sense, the precautionary principle appears synthesized in art. 15 of the Rio de Janeiro Declaration on Environment and Development, which states that “when there is a threat of serious or irreversible damage, the absence of absolute scientific certainty should not be used as a reason to postpone effective and economically feasible measures to prevent environmental degradation” (UN, 1992). In other words, even if there is no evidence or full scientific understanding about the environmental risks of a given activity, it is understood that there is a duty on the part of public or private agents to act to eliminate, neutralize or prevent it or, at least, lessen it.

Thus, it is noteworthy that the point of divergence between prevention and precaution is the scientific certainty about the risks inherent to the activity and about its possible damage to the environment, including the work environment. It is important to emphasize that the precautionary principle is not intended to make any activity that has any impact on the environment unfeasible or prohibit it. In fact, “it is not the precaution that prevents anything or sees catastrophes or evils everywhere. The precautionary principle aims at the durability of the healthy quality of life of human generations and the continuity of the nature that exists on the planet” (MACHADO, 2010, p. 72), surpassing the cautions of strict scientificity in order to protect property and rights – such as human life and health – that cannot wait for the advancement of containment science and technology, as they are endowed with the utmost dignity and potential irreparability. For no other reason, the environmentalists coined a well-known Latin phrase for the precautionary principle: “*in dubio pro natura*”. And, as we have said, this phrase transmutes, in the labor-environmental context, to the maxim “*in dubio pro homine*” (an idea usually evoked, in

⁵ See on that principles n. 5 and 7. *In verbis*: “Principle 5: The nonrenewable resources of the earth must be employed in such a way as to **avoid the danger** of their future depletion and to ensure that all mankind shares in the benefits of their use. [...] Principle 7: States should take all possible measures to **prevent pollution** of the seas by substances which may endanger human health, living resources and marine life, undermine the potential for spills, or prevent other legitimate uses of the sea” (UN, 1972, emphasis added).

the hermeneutic field – and not in the realm of facts, as it is now proposed – by the courts that make up the international human rights system, notably that of San José, Costa Rica⁶).

2.2 The principle of continuous improvement

The principle of continuous improvement states that improvement of the environment, including the work environment, should be pursued frequently, going “*pari passu*” with the progress of the state of the art. Thus, it is not enough to provide protective equipment for workers; more than that, constant attention must be paid to new technologies that more effectively eliminate, neutralize or at least reduce the risks in the work environment. Even in the strict area of protective gear supplying (NR 6), providing it is simply not enough; it is important to provide it in conditions of progressive protective effectiveness, replacing them with new models, when more modern and safer ones are released. In this sense, it is necessary to comply with art. 7, XXII of the Federal Constitution, which provides for the reduction of risks inherent to work, as well as item 6.1 of Schedule 13-A (benzene) of Regulatory Standard (NR) 15 (on unhealthy activities and operations), which expressly addresses the principle:

[...] the **principle of continuous improvement** is based on the recognition that benzene is a proven carcinogenic substance for which there is no safe exposure limit. **Every effort must be continuously endeavored** to seek the most appropriate technology to avoid worker exposure to benzene (BRAZIL, 1988, emphasis added).

It is, moreover, what follows from art. 12 of Convention 155 of the International Labor Organization, with supralegal force in the Brazilian legal system, in view of the enactment by Legislative Decree 2/1992 and the publication by Decree 1,254, of 29/Sep/1994, of the Presidency of the Republic, as well as the case law published ten years ago by the Superior Court of Justice (see, for example, HC 77,631-5/SC). In effect, art. 12 of Convention 155 says that States-parties should adopt

[...] Measures in accordance with domestic law and practice to **ensure** that those people who **design, manufacture, import, supply or dispose of machinery, equipment or substances for professional use for any reason** [...] c) carry out

6 “The *pro homine* principle is a hermeneutic criterion that informs the whole of human rights law, in virtue of which the broader norm or the more extensive interpretation must be adhered to, when it comes to the acknowledging protected rights and, conversely, the more restricted norm or interpretation, when “it is a matter of establishing permanent restrictions on the exercise of rights or their suspension in a special situation” (PINTO, 1997. p. 163 and ff).

studies and research, or otherwise **keep abreast of developments in scientific and technical knowledge** required to meet the obligations set forth in items *a*) and *b*) of this article (emphasis added)⁷.

There is no doubt, therefore, that the principle of continuous improvement is part of the existing legal system. It must thus be enforced, including in court.

2.3 The principles of information and participation

For effective observance of the principles analyzed above, all those who participate in the environment must help preserve it. This is also the case of the work environment, where all players involved must collaborate to maintain its balance, including the workers. In this regard, the principles of information and participation deserve attention, according to which, on the one hand, workers have the right to participate in decisions made on the labor environment, as it happens in the Internal Commissions on Work Accidents (CIPA), regulated in Brazil by NR 5. And likewise, for such participation to be possible, appropriate and not merely “*pro forma*”, they need to be granted access to all information on labor and environmental issues, which gives the employer an unavoidable accessory duty of providing workers with information about the work environment they operate in. By the way, this duty is included in the list of duties of the employer provided for in item 1.7 of NR 1, according to which

1.7. It is up to the employer to:

- a) Comply with and enforce legal and regulatory provisions on occupational safety and medicine;
- b) Prepare work orders on occupational safety and health, informing employees by means of announcements, posters or electronic means.
- c) Inform workers of:
 - I – Occupational hazards that may originate in the workplace;
 - II – The means to prevent and limit such risks and the measures adopted by the company;
 - III – The results of medical examinations and complementary diagnostic tests to which the workers themselves are submitted;

⁷ Subitems *a* and *b* of art. 12 provide, respectively, for States-parties to ensure that those who design, manufacture, import, supply or dispose of machinery, equipment, or substances for professional use *make sure*, as reasonably and possibly, that the machinery, equipment, or substances in question *shall not pose any danger to the safety and health of persons who make proper use of them*; and that they *provide information* on the correct installation and use of machinery and equipment, the proper use of substances, the risks posed by machinery and materials, and the hazardous characteristics of chemicals, agents, or physical or biological products, as well as instructions on how to prevent known risks.

IV – The results of environmental assessments carried out in the workplace.
[...]

Art. 13 of Convention 161 also provides likewise, when it states that “all workers shall be informed of the health risks inherent to their work”. Therefore, the information transmitted to workers must be clear and objective, using accessible and widely disseminated language (CLERC, 1982).

Accepting this principle, NR 9 (Environmental Risk Prevention Program) expressly mentions, in its item 9.5.2, the employee’s right to information, stating that “employers shall inform workers appropriately and sufficiently of the environmental risks that may arise in the workplace and the means available to prevent or limit such risks and to allow them to protect themselves against them”.

2.4 The polluter pays principle

Finally, if environmental damage – including labor-environmental damage – materializes, in violation of the prevention/precautionary pair, the *polluter pays principle*, which is extremely relevant to the employer’s liability in case of accidents and occupational diseases, is indelibly relevant. By virtue of this principle, anyone who pollutes the environment will have an “*ex delicto*” obligation to indemnify – i.e., to internalize the unduly externalized cost – for both damage to the environment and to third parties. In this sense, the one that causes imbalances in the work environment must bear the costs derived from the degradation produced. Such a commandment is expressed in art. 4, VII, of Law 6,938/81, according to which the environmental polluter should be enforced the “obligation to recover and/or indemnify for damages caused and, to the user, the contribution for the use of environmental resources for economic purposes”.

3 LARGE ACCIDENTS AND THE WORK ENVIRONMENT: ANALYZING THE BRUMADINHO CASE

On January 25, 2019, on a fateful Friday, news was spreading throughout Brazil and around the world that another dam from Vale was breaching in Minas Gerais, now in the mining town of Brumadinho, thus repeating the story of neighboring Mariana (MG), which a few years ago

had also been flooded with mud. In Brumadinho, however, human losses were higher: around 240 dead accounted for so far, including more than 130 workers of the mining company. In fact, dam “1” of Córrego do Feijão Mine was breached, followed by a huge wave of tons of mud that reached much of Vale’s administrative area and Vila Ferteco community (in Brumadinho), leaving an unprecedented trail of environmental destruction and hundreds of dead.

There was damage to the entire environment, whether in its natural aspect (since the vegetation, fauna and soil of the locality were degraded and the mud reached the Paraopeba River), its artificial aspect (with the destruction of houses, inns, and public places) and, especially, in its work aspect (with the death of several dozen Vale workers that were in the mining company building).

The Brumadinho disaster – undoubtedly a *major industrial accident* as technically defined by Convention 174 of the International Labor Organization (approved by Legislative Decree 246/2001 and enacted by Decree 4,085/2002) – can already be considered as the largest occupational accident in the history of Brazil, as we have pointed out elsewhere. According with ILO Convention 174 a “major accident” means

[...] means a sudden occurrence – such as a major emission, fire or explosion – in the course of an activity within a major hazard installation, involving one or more hazardous substances and leading to a serious danger to workers, the public or the environment, whether immediate or delayed.

In Brumadinho’s case, however, there was certainly not just one unfortunate event. Investigations carried out after the disaster point to numerous irregularities in the breached dam. Let’s look at a few aspects.

According to the National Forum of Civil Society for Watershed Management (FONASC-CBH), there were inconsistencies in the licensing process, as the company availed itself of Concomitant Environmental Licensing (LAC)⁸, given the administrative decision of the Government of Minas Gerais ensuring that large mining ventures should be rated as class 4 (subject to simpler procedures) before being rated as risk class 6. This maneuver increased the risk of dam breach.

On the other hand, the Environmental Impact Study (EIA) developed for the Brumadinho project, as presented at public hearings of March

⁸ In Concurrent Environmental Licensing (LAC), the same steps as in the Three-Phase Environmental Licensing are analyzed, with the concurrent issuance of two or more licenses (unlike the Three-Phase Environmental Licensing (LAT), where the Preliminary License, Deployment License and Operation License of the activity or development are granted in successive stages).

2019, did not contain the correct boundaries of the Direct Influence Area (IDA). The expansion of the project also provided for the suppression of vegetation in the Permanent Preservation Area (APP), in the buffer zone of Parque do Rola Moça, threatening local biodiversity.

It is also noteworthy that, besides the dams, the Córrego do Feijão Mine had several administrative and support structures very close to the main risk area, such as the administrative center, the refectory, and several maintenance workshops, as well as the loading terminal and a small rail network for iron ore shipment. All of these structures were in the likely path of mud if there was – as there actually was – a breach.

Also noteworthy is the failure of safety sirens, which should have been activated to warn workers and neighboring residents of the landslide, as provided for in the Mining Dams Emergency Action Plan, pursuant to art. 8, VII, of Law 12,334/2010 (establishing the National Dam Safety Policy). The sirens, however, did not work, as was learned from witnesses and later stated by Vale itself (ROSSI, 2019).

Finally, we point out the recommendations of the Brazilian National Academy of Engineering regarding the potential inadequacy of the *upstream dam* construction method used in practically all Vale dams in the Minas Gerais territory. Although cheaper and more frequent, the upstream elevation method is the riskiest, because the dam is built onto the tailings themselves. This risk decreases in potentially dry regions (and this is the most common assumption of its use around the world); but this was never the case in Minas Gerais, notably in the regions of Brumadinho or Mariana, due to the moist climate and the intensive rainfalls, which actually advised against using the technique (PASSARELLI, 2019).

In fact, the upstream elevation method is associated with most tailings dam collapses around the world. The most appropriate method for Brumadinho and Mariana would be the safer and more predictable *downstream elevation*, notably because the dam rises on firmer ground; no consolidated tailings for the elevations. Roughly speaking, the downstream method has greater “resistance to dynamic loading, [due to] the fact that it scales the construction up without interfering with safety, [and] thus facilitates drainage, has low susceptibility to liquefaction and makes for a simpler operation” (CARDOZO; PEPPER; ZINGANO, 2017). However, it is also the most expensive method, with the highest environmental impacts during construction. Table 1 well demonstrates its best use in the Brumadinho case.

Table 1 Comparative summary of the main construction methods of tailings dams

	Upstream	Downstream	Center line
Kind of tailings	Low density to segregation can occur	Any kind	Low plasticity mud sands
Tailings discharge	Peripheral	Standalone	Peripheral
Water storage	Not advisable for large volumes	Good	Acceptable
Resistance to seismic shocks	Low	Good	Acceptable
Embankments	Ideal is less than 10 m/year	No restriction	Few restrictions
Advantages	Lower cost, used in places with water restrictions	Greater safety	Construction flexibility
Disadvantages	Low safety, susceptible to liquefaction and piping	Great amount of material required to protect the downstream slope only in the final configuration	Needs an efficient drainage system

Source: Cardozo, Pimenta e Zingano (2017).

It was not, therefore, the best choice, by far.

So many deviant behaviors, coupled with a lack of supervision and a lack of dam maintenance, resulted in deaths and imbalance of the environment, including the workplace environment. This is the dramatic result of all that we said in the previous topics: when prevention/precaution fails, all that can be done is to find out those responsible for the purposes of criminal and civil liability, including from the perspective of labor-environmental employer accountability, in order to give effect to the principle of polluter pays.

4 LABOR-ENVIRONMENTAL (IN)BALANCE, LARGE ACCIDENTS AND EMPLOYER'S LIABILITY IN TORT

Art. 927 of the Brazilian Civil Code dictates that anyone who causes harm to another is obliged to repair it. This is also true of the environment, including the work environment, but according to the logic inherent to the polluter pays principle. From this particular perspective, anyone who degrades and therefore unbalances the work environment must compensate for both collective and individual damages (or, as stated in Article 14, § 1, of Law 6,938/1981), for both “environmental” and “third party” damage). That is what also dictates art. 225, § 3 of the Federal Constitution, on stating that “conducts and activities considered harmful to the environment shall

subject individual or legal entity offenders to criminal and administrative sanctions, irrespective of the **obligation to repair the damage caused**” (emphasis added).

The final part of the provision refers to the infraconstitutional legislation, and is a case of “improvement of the social condition” of urban and rural workers victimized by work accidents and occupational diseases, in the exact terms of art. 7, *caput in fine*, of the Constitution (which makes it possible, by virtue of the principle of the most favorable norm – which defines the dynamic hierarchy of formal sources of labor law – the restrictive rule in paragraph XXVIII, as regards the employer’s civil liability, to be excepted only “when they are guilty of willful misconduct or tort”). And the legal instrument to discipline liability for environmental damage (including that of labor) in Brazil is precisely Law 6,938/1981 that we just mentioned, which established the National Environmental Policy. In its art. 14, § 1, also already mentioned, it says that: “Without prejudice to the application of the penalties provided for in this article, **the polluter is obliged to indemnify or provide reparation for damages caused to the environment and to third parties affected by their activity, regardless of being guilty**” (emphasis added).

Precisely along these lines,

[...] When the “work habitat” proves ineffective in ensuring minimum conditions for a reasonable quality of life of the worker, the work environment will be harmed, and this complex set of material assets and intangible property can be assaulted and damaged by external and internal polluting sources coming from other enterprises, also bringing up the issue of liability for damages, since damage to the work environment is not restricted to the environment where the worker carries out their labor, but accompanies them after the end of the day (PADILHA, 2013, p. 181).

It should be noted, therefore, that in environmental matters, the one who pollutes the environment is obliged to repair it regardless of the existence of guilt, which substantiates, by definition, the hypothesis of strict liability *in tort* of the polluter. Now, if the work environment is an integral part of the general environment (art. 200, VIII, Federal Constitution), the conclusion is unappealable: strict liability in tort applies to any employer who promotes their economic activity under conditions of environmental labor imbalance (i.e., in a systemic imbalance situation), with detrimental effects on the environment or on third parties

But what, then, can we say about the final part of item XXVIII of art. 7 of the Constitution, which provides for the right of every worker

to receive “occupational accident insurance, payable by the employer, without excluding the indemnity to which they are obliged, when they fall into willful misconduct or tort”? Were there also cases of civil tort (fault) liability in the assumptions of the misfortune of work? Or, on the contrary, was there a significant constitutional change that in practice resulted in overcoming the literal interpretation of the original constituent text over thirty years ago?

This controversy, which contrasts the possibilities of employer civil fault liability with those of objective polluter strict liability in tort, is the content to one of the most well-known antinomies of Environmental Labor Law. It is, however, just an *apparent* antinomy, for the exact reasons that we will now proceed to show.

The civil fault liability of the employer – that is, that derived from the existence of *willful misconduct or tort* in their conduct (as an individual) or that of his agents and representatives, “*ex vi*” art. 7, XXVIII, of the Constitution – which we will see, in practice, obtains when the injury results from a case of topical causation (i.e., non-diffuse, univectoral linking causation triggered by facts determined in space and time), and not from systemic causality, as we have always maintained. Such are the monolinear causal courses, which have no magnitude to unbalance the work environment. Suppose, for instance, a commuting accident due to intentionally hidden damage caused in the premises of the company by the employer’s agent to the employee’s car; or a commuting accident caused by personal imprudence of the driver hired by the company, in a situation of public transportation offered to their employees. In both situations, we can find the subjective element of the conduct (willful misconduct in the first case, and tort in the second case), and the employer will be liable for the damages, pursuant art. 933 of the Civil Code, “even if there is no fault on their part” (but there will be “*lato sensu*” fault of the agent, employee or servant in carrying out the work they are charged with, exactly as provided for in art. 932, III of the Civil Code).

In the case of labor-environmental pollution (i.e., systemic imbalance of the work environment), the strict liability of the polluter will be in tort, as already stated. And who will the polluter be? It will be any “individual or legal entity, whether public or private, directly or indirectly responsible for an activity that causes environmental degradation” (art. 3, IV, of Law 6,938/1991); therefore, par excellence and relevance, the labor-environmental polluter will generally be the *employer* (although it may also be,

under certain circumstances, the employees themselves or third parties). In any case, the polluter is obliged to repair the damage caused to the work environment and the workers, regardless of tort or willful misconduct.

In order to identify a polluted work environment, we have suggested, in lieu of example, a list of indications that point out to systemic causalities (FELICIANO, 2013): (a) the effects caused on multiple workers, since all are subject to the same aggressive environmental conditions (e.g. in cases of uncontrolled unhealthy, hazardous or harsh conditions) and therefore tend to suffer similar injuries (PADILHA, 2002); (b) harmful inertia, demonstrated by previous administrative assessments with the same or similar object as that discussed in the case records; (c) “organizational malpractice” (which is not to be confused with the “*stricto sensu*” tort malpractice), commonly verifiable in cases of recent change in the company’s corporate purpose; and (d) the expert finding of aggravated or prohibited risks in that work environment (because the risk has a phenomenal aspect and can be measured, compared and quantified). To illustrate systemic damage and contrast it with our topic, we report two situations, both taken from forensic case studies:

Let us consider, e. g., the case of a worker subjected to an electric shock because his/her foreman neglected to lock off the master switch, and a third party accidentally powered the equipment being repaired. All safety procedures are generally observed, and the company took care of dispensing enough PPE, as well as guiding and supervising its use (C.TST (Supreme Court) Precedent 289). The accident was clearly due to human failure, not to a situation of organizational or environmental imbalance. Therefore, this would mean a topical causality, subject to the norm in art. 7, XVIII, of CRFB (Federal Constitution of Brazil) [...]. On the other hand, consider that labor tax auditors [...] identify about two dozen workers with bilateral sensorineural hearing loss, all assigned to the same section of a certain steelmill plant. Environmental surveys detected local noise levels ranging from 86.6 to 88.0 decibels, while medical examinations revealed that bilateral employee hearing losses ranged from 13.52% to 16.21%. In the lawsuit claiming individual damages, the witnesses heard revealed the insufficient supplying of hearing protectors, coupled with a lack of guidance or effective supervision of their use. There we find, sufficiently described, elements indicating a systemic causality of damage, thus subject to the norm in art. 14, § 1, of Law 6,938/81 (FELICIANO, 2013, p. 22-23).

From the examples outlined above, in contrast to topical causality, the systemic causality of labor-environmental pollution is directly related to the organization of the work environment, production methods, and

repeated disregard of legal obligations (with or without subjective factors that deserve reprimand, as in cases of guilt)

In addition, a distinction must be made here. Even in cases of topical causality, there will be strict liability in tort of the employer “*si et quando*”, due to its peculiarities, the economic activity developed by them pose especially high risks to workers, that is, risks higher than those borne by the other subjects that, directly or indirectly, take advantage of that activity. This is what states the sole paragraph of art. 927 of the Civil Code, according to which “an obligation to repair the damage, regardless of guild, shall obtain in the cases specified by law, or when the activity normally performed by the perpetrator of the damage entails, by its nature, a risk to the rights of others”. These are not incremental or prohibited risks, such as those that define objective labor-environmental strict liability in tort (art. 14, § 1, of Law 6,938/1981); but they are inherent superlative risks, as we have called them, due to their triggering another instance of strict liability in tort of the employer *outside* situations of imbalance in the work environment. The interpretation given by the Center for Judicial Studies of the Federal Justice Council during the First Civil Law Seminar (2002), says in its Statement 38:

Liability based on the risk of an activity, as provided for in the second part of the sole paragraph of art. 927 of the new Civil Code, obtains **when the activity normally performed by the perpetrator of the damage places a greater burden on a given person than on other members of the community** (emphasis added).

It is the instance, for example, of a property security guard shot when at work (assuming all the occupational health and safety standards applicable to their activity have been met)⁹, or the crew of an aircraft killed when it

⁹ Cf., for all, TST, RR RR-121500-82.2010.5.17.0002, 7th Panel, rapporteur, Justice VIEIRA DE MELLO FILHO, j. 9.Mar.2016. *In verbis*: “APPEAL FOR REVIEW – PAIN AND SUFFERING – EMPLOYEE VICTIM OF ASSAULT – TRANSPORTATION OF VALUABLES – AMBUSH – VEHICLE TARGETED BY FIREARM – DEATH OF COWORKERS – PSYCHOLOGICAL TRAUMA – RISK ACTIVITY – STRICT LIABILITY IN TORT. art. 7, heading, of the Constitution of the Republic, when establishing the rights of workers, makes it clear that this list is the minimum civilized level assured to those who make their labor available to the economic market, which is why the rule stated in item XXVIII of said constitutional provision does not discard the incidence of another civil liability system that is more favorable to the employee. This is the case in art. 927, sole paragraph, of the Civil Code, which must obtain every time the activity performed by the employee in the company poses risks higher than those inherent to the work performed in a subordinate manner, as it happens in the situation in the case records, where the transportation of valuables, even with the use of all preventive means recommended by public safety authorities, allowed damage to the bodily sanity of the employee, a victim of armed robbery who was subject to violence and experienced moments of terror. In the instance of the case file, the three elements necessary for employer accountability are present: (a) an activity which, considering the theory of acquired risk, poses a danger to the rights of others (equivalent to conduct, if the perpetrator of the damage were an individual); (b) violation of the right of the employee’s character, embodied in his or her bodily sanity, i.e. damage to his/her legally

crashed due to an act of God or *force majeure*.

Thus, in short, we can identify three distinct and complementary legal situations with respect to the employer's civil liability in tort for work accidents or occupational diseases: (a) Employer's civil fault liability based on willful misconduct or guilt, in cases of topical causation damage, (art. 7, XXVIII, CF; 186 and 927, heading, of the Civil Code); (b) the employer's strict liability in tort, regardless of intent or guilt, arising from an especially high risk (= inherent superlative risk) originating from their economic activity (art. 927, sole paragraph, Civil Code); and (c) the employer's strict liability in tort, regardless of intent or fault, arising from environmental imbalance or work-environmental pollution (art. 14, § 1, of Law 6.938/1981, applicable in cases of systemic damage).

In the case of major industrial accidents, as the Brumadinho episode, the employer's civil liability for damage to workers will tend to be *strict in tort*, either under hypothesis "b" (= inherent superlative risk) or under hypothesis "c" (= environmental pollution). There are examples of the first case in accidents occurring at nuclear facilities and radioactive substance treatment plants (which are not even covered by ILO Convention 174, *ex vi* of Article 1, 3, a). An example of the second case is that accident which, subject to ILO Convention 174, occurs in the context of an "installation subject to the risk of major accidents", namely, "means one which produces, processes, handles, uses, disposes of or stores, either permanently or temporarily, one or more hazardous substances or categories of substances in quantities which exceed the threshold quantity" (art. 3, c).

The latter – that of art. 14, § 1, of Law 6,839/1981 – was the case of Brumadinho, showing that the several deviations and irregularities identified above constituted what ILO Convention 174 identifies as a "major accident", namely,

[...] any unexpected event, such as a major **emission**, fire or explosion, in the course of an activity within a facility exposed to the risk of major accidents involving one or more hazardous substances and exposing workers, the population, or the environment to danger of immediate or medium- and long-term consequences (Art 3, d, emphasis added).

It must be pointed out that what is meant by "hazardous substance" is "a substance or mixture of substances which by virtue of chemical, physical or toxicological properties, either singly or in combination,

protected space; and (c) a causal link. Therefore, it became part of the commercially exploited activity. That is why we cannot conclude otherwise, but that the business in question was the determining cause of the damage inflicted on the employee. Appeal for review known and granted".

constitutes a hazard” (art. 3, *a*); and that profuse mud can surely be so defined. Moreover, even though the Brumadinho events cannot be exactly defined under the concept of “major accident” (although, in our opinion, they should), the hypothesis in art. 14, § 1, of Law 6,938/1981 would also have obtained if those deviations and irregularities determined an *increase in risk* analogous to that reported in Convention 174, art. 3, paragraphs *c* and *d*. All this, moreover, supposing that the mere existence of a dam would no longer allow, in theory, for adopting the hypothesis of inherent superlative risk (art. 927, sole paragraph, Civil Code), dispensing with any discussion of whether or not there was “pollution” for the purposes of art. 3, III, of Law 6,938/1981 (which, we must admit, certainly there was, given the anthropic basis of degradation, even though there was no guilt – and guilt, moreover, seems to have clearly obtained, there remaining only to individualize it). This is what needs to be argued in court.

There is more, though. Brazil has internationally taken on the responsibility of isolating residential and work areas from facilities exposed to the risk of major accidents, pursuant to art. 17 of ILO Convention 174:

The competent authority shall establish a comprehensive siting policy arranging for the appropriate separation of proposed major hazard installations from working and residential areas and public facilities, and appropriate measures for existing installations. Such a policy shall reflect the General Principles set out in Part II of the Convention.

It turns out that, as described above, the work and residential areas were certainly not “appropriately separated” from the immediate impact zone of a possible major accident involving the dam “1” of Córrego do Feijão Mine. Quite the contrary, they were all along the probable path of mud. If the “competent authority” has failed to carry out their duties – something that may imply the Municipality or the State here, depending on the neglected level of supervision, but which will mainly involve the *Federal Government*, in view of the powers of the National Water Agency (art. 4, XX). XXII, Law 9,984/2000) and the nature of the “supervisory body” provided for in art. 16 of Law 12,334/2010 (in the context of a *national policy*) – the Public Administration may also be charged with civil liability in tort in favor of the injured parties and their families, also under strict liability in tort (now under the terms of art. 37, § 6 of the Constitution).

Time will show the ways.

CONCLUSION

Since the subject “*Health, Environment and Work I: New Directions for Regulation*” was included in the syllabus at Law School postgraduate course of Universidade de São Paulo, we have insisted that, due to the constitutional determination of the work environment as an integral part of the human environment, the legal principles governing environmental law should necessarily apply to occupational health and safety issues, with particular emphasis on the principle of prevention, the precautionary principle, the principle of continuous improvement, the information principle, the participation principle and the polluter pays principle. The laws governing the protection of the environment and in particular Law 6,938/1981 also apply in what is compatible with them.

From this perspective, neither major industrial accidents – such as the one that struck Brumadinho on that tragic day January 25, 2019 – can be correctly assessed and dealt with, if they are not seen in the light of the legal principles listed above. Taking into account the ideas of prevention/precaution, it is from this point of view that it is acknowledged that the exposure of workers to increased risks should have been primarily eliminated or neutralized by the appropriate separation between facilities exposed to major accident risks and residential and work spaces. Where elimination/neutralization cannot be promptly carried out, all appropriate measures should have been in place so that risks would have been progressively reduced (= principle of continuous improvement or “minimum regressive risk”: art. 7, XXII, CF) – starting by adopting another constructive method (downstream elevation) – with the workers being fully informed (= information principle), and a permanent dialogue on the best work-environmental safety strategies being taking place (= participation principle).

Not so, though. Serious environmental or personal injury has been caused by labor-environmental imbalance, which now involves the polluter pays principle, imposing on the employer the “*ex delicto*” obligation to repair the damage that their activity has caused, regardless of guilt or willful misconduct. In other words, if the polluter-employer does not avoid the actualization of the risks they have created or increased, they must be held strictly liable for them in tort. And, it should be said, without the absurd quantitative claims introduced by Law 13,467/2017, for the exact reasons that the National Association of Labor Justice Magistrates mentioned in the

complaint in ADI 6050/DF, having Justice Gilmar Mendes as rapporteur.

In the 21st century hypertrophied risk society, the adoption of Environmental Law premises to address occupational health and safety issues is vital and unavoidable. It will mean, in the medium and long term, reversing economic externalities, and combating the solid culture of accounting for environmental and personal damages as immanent variables to the financial equations of business activities. It will also mean internalizing the positive effects of ILO Convention 174, still to this day a mere declaration of intent, by the very impermeability of the administrative and judicial authorities. It will perhaps mean preventing other Brumadinhos.

The time for easy ideas is past. We have to recompile them under the light of the lessons of reality. And finally, to do what the great Goethe (1749-1832) thought to be the most difficult thing: to act as we think.

BIBLIOGRAPHY

BRASIL. [Constituição (1988)]. *Constituição da República Federativa do Brasil de 1988*. Brasília, DF: Presidência da República. Available at: http://www.planalto.gov.br/ccivil_03/Constituicao/Constituicao.htm. Access on: 24 oct. 2019.

BRASIL. *Lei n. 10.406, de 10 de janeiro de 2002*. Institui o Código Civil. Código Civil. Brasília, DF. Available at: http://www.planalto.gov.br/ccivil_03/leis/2002/110406.htm. Access on: 24 oct. 2019.

BRASIL. *Norma Regulamentadora n. 1, de 1978*. Disposições gerais. Available at: https://enit.trabalho.gov.br/portal/images/Arquivos_SST/SST_NR/NR-01.pdf. Access on: 24 oct. 2019.

BRASIL. *Norma Regulamentadora n. 9, de 1978*. Programa de Prevenção de Riscos Ambientais. Available at: https://enit.trabalho.gov.br/portal/images/Arquivos_SST/SST_NR/NR-09.pdf. Access on: 6 sep. 2019.

BRASIL. *Norma Regulamentadora n. 15, de 1978*. Atividades e operações insalubres. Available at: https://enit.trabalho.gov.br/portal/images/Arquivos_SST/SST_NR/NR-15.pdf. Access on: 6 sep. 2019.

BRASIL. *Lei n. 6.938, de 31 de agosto de 1981*. Dispõe sobre a Política Nacional do Meio Ambiente, seus fins e mecanismos de formulação e aplicação, e dá outras providências. Brasília, DF. Available at: http://www.planalto.gov.br/ccivil_03/Leis/L6938.htm. Access on: 24 oct. 2019.

CARDOZO, F. A. C.; PIMENTA, M. M.; ZINGANO, A. C. Métodos construtivos de barragens de rejeitos de mineração: uma revisão. *HOLOS*, Natal, ano 32, v. 8, p. 77-85, 2017. Available at: www2.ifrn.edu.br/ojs/index.php/HOLOS/article/download/5367/pdf. Access on: 4 sep. 2019.

CENTRO DE ESTUDOS JUDICIÁRIOS DO CONSELHO DA JUSTIÇA FEDERAL. Enunciado 38. In: I Jornada de Direito Civil, 2002, Brasília. *Anais*. Brasília: Conselho da Justiça Federal, 2002. p. 43 – 43. Available at: <https://www.cjf.jus.br/cjf/CEJ-Coedi/jornadas-cej/Jornada%20de%20Direito%20Civil%201.pdf/view>. Access on: 24 oct. 2019.

CLERC, J. M. Training as an instrument of a strategy for the improvement of working conditions and environment. *International Labour Review*, v. 121, p. 565, 1982.

DERANI, C. *Direito ambiental econômico*. 3. ed. São Paulo: Saraiva, 2008.

FELICIANO, G. G. Meio ambiente do trabalho: aspectos gerais e propedêuticos. *Revista do Tribunal Regional do Trabalho da 15ª Região*, Campinas, n. 20, p. 160-203, jul.-set. 2002.

FELICIANO, G. G. O meio ambiente do trabalho e a responsabilidade civil patronal: reconhecendo a danosidade sistêmica. *Direito Ambiental do Trabalho*, São Paulo, v. 1, p. 11-25, 2013.

FELICIANO, G. G.; URIAS, J.; MARANHÃO, N. (Coords.). *Direito Ambiental do Trabalho: apontamentos para uma teoria geral*. São Paulo: LTr, 2017.

MACHADO, P. A. L. *Direito ambiental brasileiro*. 18 ed. São Paulo: Malheiros, 2010.

MARANHÃO, N. *Meio ambiente do trabalho: descrição jurídico-conceitual*. In: FELICIANO, G. G.; URIAS, J.; MARANHÃO, N. (Coords.). *Direito Ambiental do Trabalho: apontamentos para uma teoria geral*. v. 3. São Paulo: LTr, 2017, p. 27-40.

MELO, R. S. *Direito ambiental do trabalho e a saúde do trabalhador*. 5. ed. São Paulo: LTr, 2013.

MIRANDA, P. *Tratado de Direito Privado*. São Paulo: Revista dos Tribunais, 2012.

NORTH, A. Desabamento em Bangladesh revela lado obscuro da indústria de roupas. *BBC Brasil*, 28 abr. 2013. Available at: https://www.bbc.com/portuguese/celular/noticias/2013/04/130428_bangladesh_tragedia_lado_obscuro.shtml. Access on: 7 jun. 2019.

OLIVEIRA, S. G. *Proteção jurídica à saúde do trabalhador*. 2. ed. São Paulo: LTr, 1998.

ONU – ORGANIZAÇÃO DAS NAÇÕES UNIDAS. *Declaração de Estocolmo sobre o ambiente humano de 1972*. 1972. Available at: <http://www.direitoshumanos.usp.br/index.php/Meio-Ambiente/declaracao-de-estocolmo-sobre-o-ambiente-humano.html>. Access on: 10 sep. 2017.

ONU – ORGANIZAÇÃO DAS NAÇÕES UNIDAS. *Declaração do Rio sobre meio ambiente e desenvolvimento*. 1992. Available at: <http://www.onu.org.br/rio20/img/2012/01/rio92.pdf>. Access on: 10 sep. 2017.

ORGANIZAÇÃO INTERNACIONAL DO TRABALHO. *Convenção n. 155, de 3 de junho de 1981*. Segurança e saúde dos trabalhadores. Available at: https://www.ilo.org/brasilia/convencoes/WCMS_236163/lang--pt/index.htm. Access on: 24 oct. 2019.

ORGANIZAÇÃO INTERNACIONAL DO TRABALHO. *Convenção n. 161, de 7 de junho de 1985*. Serviços de saúde no trabalho. Available at: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:312306:NO. Access on: 24 oct. 2019.

ORGANIZAÇÃO INTERNACIONAL DO TRABALHO. *Convenção n. 174, de 2 de junho de 1993*. Prevenção de acidentes industriais maiores. Available at: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO:12100:P12100_INSTRUMENT_ID:312319:NO. Access on: 24 oct. 2019.

PADILHA, N. S. Meio ambiente do trabalho: um direito fundamental do trabalhador e a superação da monetização do risco. *Revista do Tribunal Superior do Trabalho*, Brasília, DF, v. 79, n. 4, p. 173-182, out.-dez. 2013.

PADILHA, N. S. *Do meio ambiente do trabalho equilibrado*. São Paulo: LTr, 2002.

PASSARELLI, H. Tipo de barragem usado em MG é inadequado ao clima, diz especialista. *Valor Econômico*, 30 jan. 2019. Available at: <https://www.valor.com.br/brasil/6097651/tipo-de-barragem-usado-em-mg-e>

inadequado-ao-clima-diz-especialista. Access on: 8 jun. 2019.

PINTO, M. El principio pro homine: criterios de hermeneutica y pautas para la regulación de los derechos humanos. In: *La aplicación de los tratados de derechos humanos por los tribunales locales*. Buenos Aires: Editorial del Puerto, 1997. p. 163-172.

PRIEUR, M. *Droit de l'environnement*. 4. ed. Paris: Dalloz, 2001.

ROSSI, A. Tragédia em Brumadinho: Vale diz que sirenes não foram acionadas por 'velocidade' do deslizamento. *BBC Brasil*, 31 jan. 2019. Available at: <https://www.bbc.com/portuguese/brasil-47063312>. Access on: 8 jun. 2019.

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