

**BREAKING DAMS IN MINAS GERAIS FROM THE PERSPECTIVE OF INTERGENERATIONAL SOLIDARITY*****O ROMPIMENTO DE BARRAGENS EM MINAS GERAIS À LUZ DA SOLIDARIEDADE INTERGERACIONAL*****José Edmilson de Souza Lima<sup>1</sup>****Larissa Milkiewicz<sup>2</sup>****Mariana Gmach Philippi<sup>3</sup>****ABSTRACT**

Intergenerational solidarity is based on article 225, caput, of the Brazilian Federal Constitution of 1988. This principle is based on the idea of equity between generations. From this, the present study intends to investigate the relation between the disasters of Mariana and Brumadinho and the principle of intergenerational solidarity. The analytical method and the bibliographic survey technique of the literature are used. The article is structured in three items. The first presents an overview of John Rawls' theory of justice, specifically his conception of justice between generations. The second item is devoted to the analysis of the principle of intergenerational solidarity, exposing its construction in the constitutional order of Brazil and its relevance in the context of the risk society. The third item deals with the environmental disasters that occurred in Mariana and Brumadinho, relating them to the principle of intergenerational solidarity. It is concluded that the challenges posed to the environment today, especially due to the unlimited nature of environmental risks, need to be faced by the legal system, in order to make effective environmental protection for future generations.

**Keywords:** Principle of Intergenerational Solidarity; justice between generations; breaking dams; Mariana and Brumadinho.

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**RESUMO**

A solidariedade intergeracional encontra fundamento no artigo 225, *caput*, da Constituição Federal de 1988. O referido princípio baseia-se na ideia de equidade entre as gerações presentes e futuras. A partir disso, o presente estudo pretende averiguar a relação entre os desastres de Mariana e Brumadinho e o princípio da solidariedade intergeracional. Para tanto, utiliza-se do método analítico e da técnica de levantamento bibliográfico sistemático da literatura. O artigo estrutura-se em três itens. O primeiro apresenta um panorama da teoria de justiça de John Rawls, mais especificamente de sua concepção de justiça como equidade entre gerações. O segundo item dedica-se à análise do princípio da solidariedade intergeracional, expondo sua construção no ordenamento constitucional pátrio e sua relevância no contexto da sociedade de risco. Por fim, o terceiro item dispõe sobre os desastres ambientais ocorridos em Mariana e Brumadinho, em 2015 e 2019, respectivamente, relacionando-os ao princípio da solidariedade intergeracional. Conclui-se que os desafios impostos ao meio ambiente na atualidade, especialmente pelo caráter ilimitado dos riscos ambientais, necessitam ser reconhecidos e enfrentados pelo ordenamento jurídico, no sentido de conferir concretude à tutela ambiental para as presentes e futuras gerações.

**Palavras-Chave:** Princípio da Solidariedade Intergeracional; justiça entre gerações; rompimento de barragens; Mariana e Brumadinho.

**INTRODUCTION**

The protection of the environment in the Brazilian legal system has acquired unmatched relevance with the advent of the Federal Constitution of 1988. In addition to conferring constitutional status to the right to an ecologically balanced environment, the Article 225 of the Constitution associated environmental protection with dignified life, imposing Government and the community the duty to preserve the environment, including for future generations.

The concern for environmental preservation for future generations finds its foundation in the principle of intergenerational solidarity. In order to fully understand the scope of such a principle, it is important to investigate the philosophical theories that underlie its construction. In this regard, the theory of justice formulated by John Rawls stands out. Although Rawls has never expressly used the term intergenerational solidarity, his theory of justice as equity deepens the debate about fair intergenerational justice. Also, the author critically addresses the issue of the reserve of transgenerational rights and duties by addressing what he calls fair intergenerational savings.

In this context, the present article starts from John Rawls' theory of justice, specifically with regard to justice and intergenerational equity, to analyze the construction of the principle of intergenerational solidarity and its reflexes in the Brazilian constitutional plan. From this analysis, the objective is to evaluate the extent to which this principle is related to the environmental disasters of Mariana and Brumadinho, which occurred, respectively, in 2015 and 2019, in the State of Minas Gerais. In order to achieve the proposed objective, the present study is based on the analytical research method and the systematic literature survey technique, developed from primary sources of information, such as books and scientific articles.

The article is structured in three items. In the first one, an overview of intergenerational justice is presented according to John Rawls, starting from the basic concepts of the theory of justice developed by the author, and then entering the Rawlsian vision of intergenerational justice. In the second item, we evaluate the treatment given to the principle of intergenerational solidarity in the Brazilian legal system, then exposing in what aspect this principle acquires relevance in the context of risk society, in which the risks imposed on the environment render unpredictable and no more liable to control or limitation. Finally, in the item three, we investigate to what extent the principle of intergenerational solidarity relates to the environmental disasters of Mariana and Brumadinho, in which the rupture of mining tailings dams triggered environmental impacts on hundreds of people, compromising the environment in ways never seen in the country's history.

The development of scientific study related to the principle of intergenerational solidarity, especially when related to recent and large-scale environmental disasters, is especially relevant, once it focuses attention on the socio-environmental impacts triggered by such events. Furthermore, it is intended to alert the scientific community and society in general to the importance of seeking effective means of preventing the occurrence of analogous disasters, which may irreversibly burden both present and future generations.

## **1 JUSTICE BETWEEN GENERATIONS IN JOHN RAWLS**

### **1.1 JUSTICE AND EQUITY IN JOHN RAWLS**

Before entering properly into the themes of equity and solidarity, according to the approach of John Rawls, it is necessary to give a brief overview about the theory of justice formulated by the author. This because the understanding of justice between generations, according to Rawls'

conception, demands, as a first measure, a walk through his understanding of what justice and equity are (SETTE, 2014, p. 459)<sup>4</sup>.

In the work entitled "A Theory of Justice," John Rawls defines justice as the first virtue of social institutions. In order to ratify this understanding, the author draws an analogy with the notion of truth, which, according to him, would be the essential virtue of thought systems. In such systems, regardless of any temptations to the contrary, theories that are not committed to the truth must be summarily rejected. For Rawls, the same is true of laws and institutions: "However efficient and well organized they are, they must be reformulated or abolished if they are unfair" (RAWLS, 2008, p. 04). From this, the institution model proposed by Rawls aims to foster and apply the value of justice in order to minimize social discrepancies (SETTE, 2014, p. 460).

It is made clear that Rawlsian theory of justice is based on the work "A Theory of Justice". In the later work of the author - "Justice as Equity" (RAWLS, 2003) - Rawls performs a theoretical reformulation of his original conceptions, based on equitable cooperation.

The basic idea of the theory of justice formulated by John Rawls is based on the conceptions of original position and "veil of ignorance". For the author, justice would be achieved through an original agreement that would meet the wishes of those involved, while minimizing the level of social discrepancy. To establish such an agreement, individuals would find themselves in the situation of the "veil of ignorance", understood as one in which "people do not know how the various alternatives will affect their particular case, and are required to evaluate principles solely on the basis theirr general considerations" (RAWLS, 2008, p. 149). In other words, behind the veil of ignorance, individuals are unaware of their place in society, their class position, or their fortune in the distribution of natural and social goods or abilities (NUNZIATO, 2002, p. 13).

Thus, when under the "veil of ignorance," people are unaware of the contingencies imposed on them. In this motto, as beings empty of these contingencies (ALBERNAZ; AZEVÊDO; CAMARA, 2012, p. 06), it would be possible to establish an agreement based on the generalized consensus, through which the principles of justice are defined, which give basis to the rules of the just in the institutions. By this means, it is intended to ensure that no one is "favored or disadvantaged in the choice of principles by the result of natural chance or by the contingency of social circumstances." In other words, according to the Rawlsian conception, justice as a general good would be the possible way, able to establish a balanced agreement to all involved, in terms of the selection of the principles of justice.as

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<sup>4</sup> It should be noted, however, that the object of this article is not the detailed analysis of John Rawls's work, but the aspects in which his theory of justice contributes to the understanding of intergenerational solidarity, which will be related to environmental protection in item two of this study.

a general good would be the possible way, able to establish a balanced agreement to all involved, in terms of the selection of the principles of justice (ALBERNAZ; AZEVÊDO; CAMARA, 2012, p. 06).

The principles of justice, to be elected by society as their foundation, constitute the object of the original agreement. These are the principles that free and rational people, even if interested in promoting their own interests, would accept in their original position, that is, "in an initial position of equality as defining the fundamental conditions of their association" (RAWLS, 2008, p. 14). These principles serve to define fundamental conditions and govern all subsequent agreements. Note that such a model of choice establishes a society based on a voluntary system, whose obligations recognized by its members are self-imposed (RAWLS, 2008, p. 14). In this approach to the principles of justice, Rawls calls justice as fairness.

In other words, John Rawls defines justice as fairness as the formation of an original consensus, made by ethical people, covered by the "veil of ignorance", and which, while driven by their own interests, would abide by principles of justice oriented towards define the basic social structure, as well as the distribution of benefits and burdens, provided such individuals were in an initial position of equality (ALBERNAZ; AZEVÊDO; CAMARA, 2012, p. 07). It should be noted that John Rawls's conception of justice is a primary conception of justice, in which it precedes the notions of goodness (ALBERNAZ; AZEVÊDO; CAMARA, 2012, p. 06).

However, it is noteworthy that, even in the context of the original position, there are limitations to be observed for the selection of possible alternatives. According to RAWLS (2008, p. 140), some selectivity criteria must be met in this process, imposing restrictions on the concept of fairness. A first order of restraint imposes that the selected principles of justice must be of universal application, permitting and recognizing the universal characteristic of ethical persons. In addition, elected principles must be public, or in other words, recognized by all participants in the agreement as known and desirable to support social cooperation. The third criterion of selectivity imposes that the principles must establish a peaceful ordering of conflicting movements in order to avoid the use of force and other irrational means. In addition, the elected principles should be those that represent the ultimate appeal of practical reasoning. Finally, the fifth selectivity criterion - especially relevant for the purpose of the present study - establish that the principles "must be general, apply without distinction and unconditionally to all, including future generations" (ALBERNAZ; AZEVÊDO; CAMARA, 2012, p. 06).

Also, the Rawlsian theory advocates that the principles capable of underpinning a theory of justice as fairness must necessarily observe basic premises (RAWLS, 2008, p. 373), namely: the priority of freedom, based on the primacy of the individual, and equitable opportunities, and eventual inequalities should only be made possible for the poor (QUINTANILHA, 2010, p. 39). From these premises, it can be inferred that Rawls's theory of justice establishes two basic principles, oriented to

managing social relations and conferring a provisional form of consensus on the original position (QUINTANILHA, 2010, p. 39). It is the principle of equality and the principle of difference, which stipulate, in short, that "justice does not authorize the loss of freedom, except to benefit those who have less freedom" (SETTE, 2014, p. 461). Thus, the situations in which inequality could be accepted are those in which such differentiation increases the opportunities of those who originally possess them to a lesser extent.

## 1.2 THE CONCEPTION OF JUSTICE BETWEEN GENERATIONS

After presenting the foundations that underlie his theory of justice, RAWLS (2008, p. 354) points out that the investigation of justice as equity demands an analysis from the perspective of intergenerational justice, under penalty of becoming incomplete. In this sense, the author states that there are duties between generations, in the same sense of what is observed among contemporaries, and it is not possible for the current generation to act in an uncompromising way and without looking to the future. Rather, it is up to her to fix her principles of justice based on a concern for individuals from different eras.

From this concern, RAWLS (2008, p. 355) establishes the concept of fair intergenerational saving, stating that it is up to the present generation to save for those who will succeed it. However, the difficulty in defining what resources will be needed over time for future generations is recognized. In addition, Rawls suggests that all generations hypothetically indicate what saving arrangement they would make, either for the present or for a future moment. For the author, such thinking would allow us to choose an appropriate principle of fair savings, since all generations are virtually represented in the original position (RAWLS, 2008). Thus, Rawls understands that the fair sharing of benefits is possible for all subsequent generations, "except the first, which will submit the initial intergenerational solidarity contract to its own contemporaries, and necessarily be the only generation that will bear the burden of not enjoy any benefit, only the costs of the initial savings" (DOMINGUES, 2010, p. 140).

In this bias, all generations start from an initial agreement regarding the goods to be passed on to the subsequent generation, which in turn must do the same in relation to the next. Thus, also in this respect, the veil of ignorance proves to be useful for the construction of justice as equity. ASSUMPÇÃO (2019, p. 68) underscores this importance, stating that if generations don't know where they are in time and in the social context, "then they make their best choices, in the expectation that the previous generation did too" (ASSUMPÇÃO, 2019, p. 68).

For Rawls, the savings for the future are close to the existing family ethics between parents and children. In other words, for the present generation to be concerned about saving, one must

imagine the role of parents who reserve their children - through fair saving - access to the same rights to which their ancestors had access (RAWLS, 2008, 359). In this vein, Rawls sustains a social cooperation that aims to equitably distribute the benefits over time (DOMINGUES, 2010, p. 140). Rawls further contends that past facts cannot be altered, but a satisfactory social minimum may be guaranteed to subsequent generations.

Rawls's theory of justice is based on the notion of equitable freedom, directly related to equal opportunities (RAWLS, 2008, p. 373). In this bias, the achievement of fair savings by the present generation, by preserving a satisfactory social minimum, is what guarantees equal opportunities for future generations. Rawlsian theory, in dealing with intergenerational justice, doesn't establish any order of priority to the present generation on the grounds of its past temporal location. By contrast, the current generation has no priority over later ones simply because it is situated at an earlier stage in the timeline (CUNHA, 2016, p. 28). Thus, pure temporal preference for Rawls can be understood as favoring the present generation by a simple temporal position (RAWLS, 2008, p. 316), which would, in the author's view, consist in true injustice to future generations.

While Rawls's theory of justice does not explicitly address the issue of intergenerational solidarity - at least not in these terms - it is evident from Rawls's work that there are several elements that support the duty of concern for future generations. , in order to guarantee them access to equal opportunities, arousing in the present generation the concern to save their resources for those who will succeed it.

## 2 INTERGENERATIONAL SOLIDARITY AND ENVIRONMENT

Once the conception of intergenerational justice has been analyzed, in John Rawls' theory, it is important to analyze how the conception of intergenerational solidarity emerges, especially in normative terms, specifically regarding the protection and preservation of the environment.

### 2.1 INTERGENERATIONAL SOLIDARITY IN LEGAL ORDERING

In the national legal system, environmental protection was expressly recognized and guaranteed in constitutional terms, elevated to the *status* of fundamental right. The Federal Constitution of 1988 governed, in its article 225, *caput*<sup>5</sup>, the right to the environment ecologically

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<sup>5</sup> Art. 225. Todos têm direito ao meio ambiente ecologicamente equilibrado, bem de uso comum do povo e essencial à sadia qualidade de vida, impondo-se ao Poder Público e à coletividade o dever de defendê-lo e preservá-lo para as presentes e futuras gerações.

balanced, giving it the category of common good of the people and relating it to the right to life. With regard to the duty of environmental preservation, the same constitutional provision assigned to the Public Power and the collectivity the duty to care for the environment and preserve it, not only in present terms, but also for future generations.

In this step, the reference to an intergenerational environmental preservation duty is expressed in the Brazilian constitutional discipline. Moreover, it is observed that the right to an ecologically balanced environment is disciplined, at the constitutional level, as an imprescriptible and intertemporal right, since it consecrates even future generations among its beneficiaries (BENJAMIN, 2008).

It should be noted, however, that such normative provision was not the precursor in terms of disposition correlated with the duty of intergenerational environmental solidarity. Concern about ensuring future generations' access to a healthy environment had been expressed years earlier in the Stockholm Declaration on the Human Environment, published in 1972. Principles 2 and 5<sup>6</sup> of the Declaration denote the intention to ensure a precautionary environmental stance for future generations. Especially Principle 5 reveals a strong concern about the risk of future depletion of non-renewable natural resources, directing the international community to act to ensure that future generations of humanity have access to the benefits related to the use of these resources.

Continuing the tendency that began in 1972, the 1992 Rio de Janeiro Declaration on the Environment reaffirmed international concern for intergenerational solidarity in environmental protection. Principle 3<sup>7</sup> of the Declaration states that the right to development must be exercised in a way that equitably responds to the needs of present and future generations, including in terms of environmental preservation.

It is inferred, therefore, from the International Declarations on Environmental Protection, of 1972 and 1992, that environmental intergenerational solidarity is an explicit concern in an international context, received by the Brazilian legal system, expressly from the Federal Constitution of 1988. It is noteworthy that solidarity arises in yet another constitutional homeland. It's about the

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<sup>6</sup> Princípio 2 - Os recursos naturais da Terra, incluídos o ar, a água, o solo, a flora e a fauna e, especialmente, parcelas representativas dos ecossistemas naturais, devem ser preservados em benefício das gerações atuais e futuras, mediante um cuidadoso planejamento ou administração adequada; Princípio 5 - Os recursos não renováveis da Terra devem ser utilizados de forma a evitar o perigo do seu esgotamento futuro e a assegurar que toda a humanidade participe dos benefícios de tal uso. (**Declaração de Estocolmo sobre o ambiente humano** - Publicada pela Conferência das Nações Unidas sobre o meio ambiente humano, em junho de 1972. Available at: <http://www.direitoshumanos.usp.br/index.php/Meio-Ambiente/declaracao-de-estocolmo-sobre-o-ambiente-humano.html>. Accessed on Jun 15th. 2019).

<sup>7</sup> Princípio 3 - O direito ao desenvolvimento deve exercer-se de forma tal que responda equitativamente às necessidades de desenvolvimento e ambientais das gerações presentes e futuras. (**Declaração do Rio sobre Meio Ambiente e Desenvolvimento**. Available at: [http://www.meioambiente.pr.gov.br/arquivos/File/agenda21/Declaracao\\_Rio\\_Meio\\_Ambiente\\_Desenvolvimento.pdf](http://www.meioambiente.pr.gov.br/arquivos/File/agenda21/Declaracao_Rio_Meio_Ambiente_Desenvolvimento.pdf). Accessed on Jun 15th. 2019).



article 3rd of the Federal Constitution<sup>8</sup>, which lists solidarity as the foundation of the Democratic Rule of Law, reflecting a leading perspective of the Magna Carta (DAROS; KÖLLING; MASSAÚ, 2016, p. 264) and, therefore, in line with the proposed intergenerational law in the environmental field (CORREIA; DIAS, 2016, p. 08).

In addressing the question of solidarity, Richard RORTY (2007, p. 312) points out that, especially in historical periods when institutions and traditional standards of conduct collapse, society seeks something that transcends historical and institutional standards. In this setting, Rorty points to human solidarity as the central element that transcends these boundaries, uniting individuals<sup>9</sup>.

Focusing specifically on intergenerational solidarity, SILVA (2011) considers that the principle of intergenerational solidarity derives from the constitutional and international recognition of the right of future generations to the ecologically balanced environment, a recognition that implies the imposition - to the Public Power and the collectivity - of the duty to ensure such preservation for future generations.

In the same vein, MILARÉ (2018, p. 268) points out that the purpose of intergenerational solidarity is to ensure the solidarity of the present generation with future generations, in order to ensure that they can sustainably enjoy the natural resources currently available. The author goes on emphasizing the importance of the theme, especially considering that “it is already consuming about 30% beyond the planetary capacity of support and replacement” (MILARÉ, 2018, p. 269).

The inclusion of the principle of intergenerational solidarity in the Federal Constitution of 1988 reflects the new challenges posed to the legal system and society as a whole in addressing environmental issues. In this regard, Antônio Herman BENJAMIN (2008, p. 40) notes the assumption of an ethical commitment by the Federal Constitution, so as not to impoverish the biodiversity of the environment, thus maintaining the options open to future generations. In the same vein, SARLET and FENSTERSEIFER (2017, p. 96) point out that the constitutional treatment given to environmental protection aims to safeguard, above all:

environmental conditions conducive to the development of human life at levels of dignity not only for the generations that now inhabit the earth and enjoy the natural resources, but also ensuring such conditions for the generations that will inhabit the earth in the future. This, of course, necessarily implies a set of duties and responsibilities to present generations to future generations.

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<sup>8</sup> Art. 3º Constituem objetivos fundamentais da República Federativa do Brasil:

I - construir uma sociedade livre, justa e solidária.

<sup>9</sup> Esclarece-se, no entanto, que Rorty rechaça a concepção de “eu nuclear”, própria da filosofia tradicional. Para mais informações a esse respeito, sugere a leitura da obra: RORTY, Richard. **Contingência, ironia e solidariedade**. Tradução de Vera Ribeiro. São Paulo: Martins Fontes, 2007, p. 310-314.

The authors go on, recognizing the existence of a certain vulnerability on the part of future generations, which imposes on the legal system the need to ensure them legal protection, limiting the rights of the current generation. The principle of intergenerational solidarity thus establishes moral and legal responsibility for the present generation, in order to preserve equity between different generations (SARLET; FENSTERSEIFER, 2017, p. 96).

From this point of view, there is a recognition that static law doesn't respond to contemporary and increasingly complex issues in the face of a dynamic, forward-looking world (DAROS; KÖLLING; MASSAÚ, 2016, p. 266). In view of this, the legal system impose the challenge of solving issues that go beyond temporal and geographical limits.

## 2.2 INTERGENERATIONAL SOLIDARITY IN THE CONTEXT OF THE RISK SOCIETY

In the contemporary environmental field, intergenerational solidarity is highlighted when considering the risks imposed on the environment, which can no longer be contained or limited to the present generation, and their effects for the future. These are abstract risks, addressed by Ulrich BECK (2011) in his theory of risk society. According to the author, pre-industrial society was marked by the existence of dangers, which were mainly related to natural phenomena, such as floods, storms, pests and other events, often associated with the will of gods and demons. At this stage, the force of nature was largely responsible for triggering such phenomena.

From the beginning of industrial development, with the intensification of technological and social transformations, another kind of threat is added to the dangers, namely the concrete risks produced by human actions and decisions. These are manufactured risks, triggered by humanity itself (FERREIRA; FREITAS, 2016). Still, at this stage, we are facing calculable risks. Moreover, its effects are containable through rational control.

However, over time, the development of increasingly disruptive technologies and the complexization of the sciences have effects on threat categories, resulting in risks that are beyond calculation and whose effects are unpredictable (CAVEDON; FERREIRA; FREITAS, 2015). These are the abstract risks inherent in BECK'S era of second modernity (2011). In this new period, there is the so-called risk society, marked by the pattern of uncertainty. As DEMAJOROVIC (2003, p. 36), points out, "this new society cannot break free from industrial society, since it is especially industry, together with science, that is primarily responsible for generating the threats that build risk society."

In other words, the risk society emerges as a transition from the risks arising from modern society, in which human actions break the previously prevailing standards of certainty, drastically reducing the pillars of security (BECK, 2011, p. 64). So it results in a society of uncertainty, which has

its main distinctive mark on imminent risks and inaccuracies. Within the abstract risks denounced by BECK (2011), we highlight the environmental risks, related to the so-called ecological crisis, byproduct of the risk society.

The risks imposed on the environmental are paradigmatic examples of often unpredictable, transboundary threats whose effects extend over time to intergenerational risks. Ultimately, this is undeniable evidence of the environmental crisis (MOREIRA; LEITE, 2006) that is affecting present and future generations. Facing this scenario, AYALA (2003) points out that the right to life is driven to a broad state of insecurity, the duration of which cannot be objectively determined. The risks unleashed by this complex scenario reach an undetermined number of subjects and can reach a global scale without being limited to the present generation. In other words, they are potentially intergenerational risks (GIDDENS, 1991. p. 126-127).

The realization that there are abstract risks - incalculable, cross-border and intergenerational - that cannot be predicted or contained, puts into question the myth of progress. Until the advent of the risk society, threats were thought to be inherent in progress. From the second modernity, however, one can no longer think of abstract risks as minor aspects, a natural consequence of the path to development (CAVEDON; FERREIRA; FREITAS, 2015). As MORIN and KERN (2003. p. 91), warn, "the myth of progress collapses today, development is sick; all threats to humanity as a whole have at least one of their causes in the development of science and technology".

Despite the realization of such complexities and threats, human actions continue to endanger life and access to a healthy environment. The previously unthinkable growth of the productive forces, increased and made possible by technological evolution, makes the threats triggered by human activities reach previously unknown dimensions (TAVOLARO, 2001, p. 114-115.). In this scenario, unprecedented environmental catastrophes are highlighted, with drastic consequences for human life and biodiversity. In the national context, two recent events have earned their position among the worst environmental disasters in the country's history. These are the events of Mariana and Brumadinho, whose reflexes are not yet fully known.

### **3 MARIANA AND BRUMADINHO: THE IMPACT ON THESE AND FUTURE GENERATIONS**

Once the normative treatment of intergenerational solidarity has been ascertained and the extent to which this principle acquires unique importance in the context of risk society, it is important to analyze two of the most recent and important environmental disasters in Brazilian history.

The disastrous events that took place in Mariana and Brumadinho, respectively in 2015 and 2019, left a trail of destruction and highlighted the possible environmentally burdensome legacy that can be passed on to future generations.

### 3.1 ENVIRONMENTAL IMPACTS IN MARIANA AND BRUMADINHO

On November 5th, 2015, the Fundão mining tailings dam was disrupted, located in the municipality of Mariana, Minas Gerais. The disruption launched 34 million cubic meters of ore tailings - the equivalent of 14,000 Olympic pools (LOPES, 2019, p. 03) - into the environment, striking and compromising part of the Santarém mining dam. The dams belonged to the mining company Samarco, controlled by BHP Billiton Brasil Ltda. and by Vale S.A.

The event led to the release of more than 55 million cubic meters of tailings from the iron ore beneficiation process, causing the deaths of 19 people. Among the direct results of the tailings release, FERREIRA, SCOTTI and SILVA (2015, p. 138) highlight:

Such volume, equivalent to a cube approximately 400 meters in side, caused the death of 18 people and the disappearance of one, and directly impacted the Rio Gualaxo do Norte, Rio do Carmo and Rio Doce, as well as the riparian forest fragments. It reached a total of 39 neighboring municipalities from Mariana (MG) to the mouth in the village of Regência in the municipality of Linhares (ES) (Figure 2). In addition, part of the tailings was carried to the Atlantic Ocean impacting several beaches in the region and altering the marine ecosystem.

As for the environmental impacts resulting from the disaster, many are still uncertain and inaccurate. The Government of the State of Minas Gerais estimates that the environmental and social consequences of the disaster extend over 570 kilometers from the municipality of Mariana, reaching approximately 35 counties of Minas Gerais and 3 other counties of the state of Espírito Santo, in addition to an indigenous reserve of ethnic Krenak, reaching the mouth of the Atlantic Ocean (FREITAS; MENEZES; SILVA, 2016, p. 26).

From the reports published by the Brazilian Institute of Environment and Renewable Natural Resources - IBAMA and the Government of Minas Gerais, it can be noted that the tailing significantly affected the water quality in the region. The material from the dam is deposited in the riparian forest, geomorphologically altering the basin. It is not possible to specify the amount of silted material in the riparian forest. In addition, the region's water is found to be contaminated by a number of potentially toxic metals such as lead, mercury and aluminum. There is also a drastic loss of biodiversity of fauna

and flora, still impossible to be precisely quantified. Soil was also affected, with a drastic reduction in fertility levels (FERREIRA; SCOTTI; SILVA, 2015, p. 146).

The impacts on the way of life of the population cannot be ignored yet. Losses generated by the disaster affect patterns of social organization, collective identity, and community ties. Moreover, the diverse cultural practices hitherto existing in the region, which gave concrete effect to the way of life of the affected population, were extinct, possibly irreversibly<sup>10</sup>.

Marcus Vinícius Polignano<sup>11</sup> points out the occurrence of irreparable environmental damage triggered by the Mariana disaster. According to him, for the vast majority of the damage generated in the region, there is no mention of an environmental recovery plan. The disaster will remain forever as a scar of the environmental issue in Minas Gerais, with no possibility of return to the previous state.

Unfortunately, just over three years after the Mariana disaster, another episode added a tragic sequence to the history of dam-related tragedies in Brazil. This is the rupture of the tailings dam of the Córrego do Feijão mine, which occurred on January 25, 2019, in the county of Brumadinho, also in the state of Minas Gerais and also explored by Vale.

This time, the rupture gave rise to about 11.7 million cubic meters of mud, characterized by high silicon and iron content, which reached the bed of the Iron and Coal stream. The accident caused the deaths of about 110 people, leaving more than 200 missing (BARBOSA; CERIONI, 2019). Considering this is a recent event, the impacts unleashed by the tragedy have not yet been fully ascertained. Preliminary data, however, are quite significant.

The analysis carried out by IBAMA's National Center for Monitoring and Environmental Information (CENIMA)<sup>12</sup> shows that the mining tailings released by the dam rupture devastated 133.27 hectares of native Atlantic Forest vegetation. In addition, 70.65 hectares of Permanent Preservation Areas (APP) were compromised along watercourses affected by mining tailings.

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<sup>10</sup> Diagnóstico do desastre de Mariana aponta danos irreparáveis e falta de diálogo do poder público com atingidos. **Revista Instituto Humanitas Unisinos**. 08/05/2018. Available at: <http://www.ihu.unisinos.br/78-noticias/578695-diagnostico-do-desastre-de-mariana-aponta-danos-irreparaveis-e-falta-de-dialogo-do-poder-publico-com-atingidos>. Accessed on Jul 5th. 2019.

<sup>11</sup> Project Coordinator Manuelzão, an environmental project developed by the Federal University of Minas Gerais, which monitors economic activity and its environmental impacts on watersheds, working on the revitalization of the main mining rivers. (MENDONÇA, Heloísa. Lama de Mariana pavimentou rios por onde passou. Dano é irreversível. **Revista Instituto Humanitas Unisinos**. 16/11/2015. Available at: <http://www.ihu.unisinos.br/169-noticias/noticias-2015/549064-lama-de-mariana-pavimentou-rios-por-onde-passou-dano-e-irreversivel>. Accessed on Jul 5th. 2019).

<sup>12</sup> Rompimento de barragem da Vale em Brumadinho (MG) destruiu 269,84 hectares. **IBAMA**. 30/01/2019. Disponível em: <http://www.ibama.gov.br/noticias/730-2019/1881-rompimento-de-barragem-da-vale-em-brumadinho-mg-destruiu-269-84-hectares>. Accessed on Jul 5th. 2019.

The Emergency Mission Report sent to Brumadinho / MG after the dam breach (CONSELHO NACIONAL DOS DIREITOS HUMANOS, 2019) found the main social and environmental impacts triggered by the accident:

(a) Habitat destruction and extinction of the ichthyofauna in the extent of stricken rivers; (b) contamination of water in rivers hit by ore tailings mud; c) Suspension of water withdrawals for economic activities, rural properties and small communities; (d) siltation of river beds and reservoirs of power generation dams; e) Burial of the lagoons and springs adjacent to the riverbed; f) Destruction of riparian and aquatic vegetation; g) Interruption of the connection with tributaries and marginal lagoons; h) Alteration of water flow; (i) destruction of fish breeding areas; j) Destruction of ichthyofauna replacement “nursery” areas (feeding areas for larvae and juveniles); k) Alteration and impoverishment of the trophic chain to the full extent of the damage; l) Interruption of gene flow of species between water bodies; (m) loss of species with habitat specificity (rapids, locas, wells, backwaters, etc.); n) Specimen mortality throughout the food chain; o) Worsening in the state of conservation of species already listed as threatened and entry of new species in the list of threatened; (p) impairment of the structure and function of associated aquatic and terrestrial ecosystems; q) Impairment of fish stocks - impact on fishing; r) Impact on the way of life and ethnic and cultural values of indigenous peoples and traditional populations.

It appears from the Report released by the National Council of Human Rights that the impacts resulting from the Brumadinho disaster, in the same sense as that observed in Mariana, affect multiple socio-environmental aspects - fauna, flora, water quality, quality of the environment. soil, socio-cultural practices, etc. Given that this is a recent and unprecedented event in the country's history, as far as its scope is concerned, it is not yet possible to specify all its developments. Therefore, we cannot rule out the hypothesis that unverified impacts will be perceived so far.

### 3.2 THE INTERGENERATIONAL SOLIDARITY AND THE DISASTERS OF MARIANA AND BRUMADINHO

The two environmental disasters analyzed - Mariana and Brumadinho - highlight the need for effective environmental protection committed to access to a healthy environment, given that the impacts caused by such tragedies transcend the limits of time and space.

Returning to the concept of intergenerational justice structured by John Rawls, it is imposed that the perception that there are duties and obligations between present and future generations, as those existing among contemporaries. Applying Rawlsian theory to environmental protection, it is extracted that it is not possible for the present generation to act without any limitation, enjoying natural resources as they please (SETTE, 2014, p. 471-472). Instead, guided by the principles of

intergenerational justice, the present generation must act consciously in order to safeguard the necessary intergenerational environmental balance and ensure fair intergenerational savings.

The difficulty in containing the environmental impacts triggered by the tragedies of Mariana and Brumadinho shows the abstract character of such risks, as consequences of the ecological crisis experienced globally (BECK, 2011). As noted in the reports released from such disasters, their effects affect multiple aspects of the ecosystems in which they occurred. Moreover, much of this damage is not recoverable or returned to its previous state (MENDONÇA, 2015). Soil, water, fauna, flora and lifestyle and social practices, until then existing in the regions affected by the tailings of dams, have been irreversibly affected, impacting the lives of hundreds of people, and significantly compromising the local biodiversity (CONSELHO NACIONAL DOS DIREITOS HUMANOS, 2019).

The environmental tragedies of Mariana and Brumadinho denounce the intergenerational character of environmental risks, triggered and intensified by human action (CAVEDON; FERREIRA; FREITAS, 2015). In this regard, intergenerational solidarity is sullied, as the impacts of the breaking of dams will be felt for an unlimited period of time, compromising the access of future generations to a healthy environment, as natural resources won't be available to them and the same living practices (environmental, social and cultural) existing in the region before the fateful events.

It cannot be forgotten that even the search for a model of law based on intergenerational solidarity presents an inherent paradox, because as AYALA and MORATO LEITE (2002, p. 26) warn, "The states are at the same time forced to guarantee, on the one hand, production, cutting-edge technology and, on the other, the ecological balance". Such clash remains clear in the environmental disasters analyzed in the present study, in which the economic exploration of a specific sector - mining - was related to the triggering of intergenerational environmental damage. However, as RAWLS (2008, p. 04) points out, every individual has a natural inviolability, founded on justice and freedom, which cannot be usurped even by the welfare of all society. Thus, the advantages perceived by many cannot cost sacrifices to others, since "the rights guaranteed by justice are not subject to political negotiations or the calculation of social interests" (RAWLS, 2008, p. 04).

The effects imposed on the environment and the right to life from the tragedies of Mariana and Brumadinho reaffirm the importance that the principle of intergenerational solidarity does not become a dead letter, especially in the face of today's alarming risks to the environmental good. It is important to emphasize that the right to the environment ecologically balanced is related to the

dignified life<sup>13</sup>, which, in turn, demands the maintenance of an environment in which “one can live, not survive, amid the chaos generated by great environmental impacts” (FRANÇA, 2016, p. 12).

In this regard, the unpredictability of the consequences of environmental impacts over time, as illustrated by the cases of Mariana and Brumadinho, is a major factor for the inclusion of future generations in the agenda of environmental decisions at national, community and international levels, in order to make viable. intergenerational equity.

## CONCLUSIONS

The study shows the importance of thinking about the impacts imposed on future generations, from the occurrence of major environmental disasters, such as those in Mariana and Brumadinho. The look from John Rawls's theory of justice rejects the existence of any order of priority to the present generation over the future, simply because of its past location on the timeline. Thus, the Rawlsian theory of justice as equity focuses on the existing moral and ethical duties towards future generations, in order to guarantee to those who will come an equitable distribution of benefits over time.

The principle of intergenerational solidarity interacts with Rawls's concepts of intergenerational equity. This principle is enshrined in the Federal Constitution of 1988, which establishes, in its article 225, the duty of environmental preservation in favor of future generations. It is clear that this obligation is relevant in the context of risk society, in which abstract risks - unpredictable, transboundary and intergenerational - increase the threats to the environment for present and future generations.

Transposing this rationality to the disasters of Mariana and Brumadinho, it is observed that such events salutarily exemplify the existence of environmental risks that no longer observe geographical or temporal boundaries. The two disasters, highly significant in the country's history, have triggered irreversible environmental damage, the impacts of which cannot even be fully known at this stage, and which will be felt over time.

In this bias, it is recognized the vulnerability of future generations in the episodes of Mariana and Brumadinho, as indirect and still latent victims of disastrous events, triggered and aggravated by human action. Given this, it is up to the legal system to face the challenges posed by environmental risks today, recognizing their transboundary and intergenerational character and giving concreteness to environmental protection mechanisms for present and future generations.

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<sup>13</sup> Conforme Constituição Federal de 1988, artigo 225, *caput*: “Todos têm direito ao meio ambiente ecologicamente equilibrado, bem de uso comum do povo e essencial à sadia qualidade de vida, impondo-se ao Poder Público e à coletividade o dever de defendê-lo e preservá-lo para as presentes e futuras gerações”.



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