geo graphia

THE DAM BREAK OF VALE'S TAILINGS DAM IN BRUMADINHO (2019) AND CHANGES IN VOTING BETWEEN THE 2018 AND 2022 ELECTIONS

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Abstract: The research aims to understand shifts in voting expression following the Brumadinho dam disaster in Minas Gerais (MG). Drawing on debates in Electoral Geography, the study considers how a territory that has experienced a catastrophe articulates its political space through its choice of representatives. The empirical scope focused on analyzing local voting patterns in the election immediately preceding (2018) and following (2022) the dam collapse in 2019, covering both executive and legislative offices at the state and federal levels. The methodology relies on identifying political parties based on distinctions within the political-ideological spectrum, used as a metric to understand each party's movement within a cohesive set, allowing for comparisons. Results indicate a shift in voter behavior post-disaster, with decreased support for centrist and center-right candidates and a corresponding increase in votes for left-wing and far-right parties. Additionally, voting trends suggest a search for localized solutions, reflected in strong support for political figures associated with the disaster and socio-environmental agendas. The findings also highlight the need for further studies to understand other local issues, such as the inverse relationship between the increase in the number of voters and the decrease in the Brumadinho population.
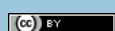**Keywords**: Electoral geography; Brumadinho; Political spectrum, Elections; Vale S.A.; Environmental Disaster.

O ROMPIMENTO DA BARRAGEM DE REJEITOS DA VALE EM BRUMADINHO (2019) E AS MUDANÇAS NO VOTO ENTRE AS ELEIÇÕES DE 2018 E 2022

Resumo: A pesquisa tem por objetivo compreender as mudanças na expressão do voto a partir do evento do rompimento da barragem de Brumadinho (MG). Apoiando-se nos debates da Geografia Eleitoral, considera-se como um território que passou por uma catástrofe expressa esse espaço político na escolha dos seus representantes. O recorte empírico se apoiou na análise das votações locais da eleição imediatamente anterior (2018) e posterior (2022) ao evento-rompimento, ocorrido em 2019, para cargos do executivo e legislativo, estadual e federal. A metodologia se apoia na identificação dos partidos políticos com base na sua diferenciação dentro do espectro político-ideológico, utilizado como métrica para a compreensão do movimento de cada partido dentro de um conjunto coeso, permitindo comparações. Os resultados apontam uma mudança no comportamento dos eleitores após o rompimento da barragem, uma vez que houve uma queda na votação nos candidatos de centro e centro-direita e consequentemente o aumento na votação nos partidos de esquerda e extrema direita. Observou-se também, uma votação que pode indicar a busca por soluções territorializadas, expressa pela votação expressiva em figuras políticas ligadas ao evento e também à pauta socioambiental. Os resultados indicam, ainda, a necessidade de estudos mais aprofundados visando compreender outras questões locais, como a relação inversa entre o aumento do número de eleitores e a diminuição da população brumadinhense.
Palavras-chave: Geografia eleitoral; Brumadinho; Espectro político-ideológico; Eleições; Vale S.A.; Desastre ambiental.

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LA RUPTURE DU BARRAGE DE VALE À BRUMADINHO (2019) ET L'ÉVOLUTION DU VOTE ENTRE LES ÉLECTIONS DE 2018 ET DE 2022

Résumé: Cette recherche vise à comprendre les changements dans l'expression du vote à la suite de la rupture du barrage de Brumadinho (MG). En s'appuyant sur les débats de la géographie électorale, elle examine comment un territoire ayant subi une catastrophe exprime cet espace politique dans le choix de ses représentants. L'analyse empirique repose sur l'examen des résultats électoraux locaux de l'élection immédiatement antérieure (2018) et postérieure (2022) à la rupture du barrage, survenue en 2019, pour les postes exécutifs et législatifs, tant au niveau régional que national. La méthodologie repose sur l'identification des partis politiques en fonction de leur différenciation dans le spectre politico-idéologique, utilisé comme métrique pour comprendre l'évolution de chaque parti au sein d'un ensemble cohérent, permettant ainsi des comparaisons. Les résultats indiquent un changement dans le comportement des électeurs après la catastrophe, avec une baisse du vote pour les candidats de centre et de centre-droit, et, en conséquence, une augmentation du soutien aux partis de gauche et d'extrême droite. On observe également une tendance à privilégier des solutions territorialisées, illustrée par le vote significatif en faveur de figures politiques liées à l'événement ainsi qu'aux questions socio-environnementales. Les résultats soulignent également la nécessité d'études plus approfondies pour mieux comprendre d'autres dynamiques locales, comme la relation inverse entre l'augmentation du nombre d'électeurs et la diminution de la population de Brumadinho.

Mots-clés : Géographie électorale ; Brumadinho ; Spectre politico-idéologique ; Élections ; Vale S.A. ; Catastrophe environnementale.

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Introduction

The growing interconnection between environmental transformations and political decisions has become an increasingly debated and evident reality in political discourse, encompassing issues at local, regional, national, and global scales. As Latour (2020) argues, the (forced) transition from "spectators" to "protagonists" in the context of environmental changes necessitates a reconfiguration of the notion of Nature into another dimension: that of politics. Likewise, it has become more apparent how political decisions impact different groups and places in distinct ways, exposing and producing power dynamics embedded in our society (Silva, 2023).

The contribution of the field of Political Geography, in this sense, also involves understanding that "...the political issue is at the core of the environmental challenge, through the territory" (Porto-Gonçalves, 2006, p. 291). Electoral Geography, as an analytical subfield, is responsible for examining the relationship between electoral processes and geographical space, which requires an understanding of both political representation systems and the spatial processes at play that drive electoral dynamics (Azevedo, 2023).

This article aims to contribute a geographical perspective on politics through the lens of a "strong" or contextual Electoral Geography, in which geographical space is understood "as an explanatory element of the phenomenon, in a relationship of possible causality" (Azevedo, 2023, p. 11). Thus, space is not merely synonymous with location; rather, location becomes a characteristic considered in all political actions and electoral decisions. Likewise, territory is not merely a stage for actions; its active role in society means that "the vote can then be explained by space" (Castro, 2009, p. 149).

From this perspective, the temporal analytical focus begins with the collapse of a tailings dam between two elections (2018 and 2022), highlighting the rigidity of geographical materialities as a key analytical feature of political action. The collapse is a phenomenal dimension that, from the site of its direct impact, reveals the thick global, national, and regional connections through which the mining sector operates.

More specifically, and based on this analytical framework, the study seeks to investigate the impacts of the collapse of the Córrego do Feijão Mine Dam in 2019 on the territory of Brumadinho (MG), considering changes in the municipality's political-party preferences between the 2018 and

2022 elections. To this end, the collapse is considered a geographical event (Santos, 2011, p. 144-146), a singular occurrence that imparts a new dynamic to the totality of the place (Santos, 1996, p. 144). Thus, the term "collapse-event" is used to refer to the systemic occurrence on January 25, 2019, in Brumadinho (MG), which led to the rupture of dams B-I, B-IV, and B-IV-A, part of the Córrego do Feijão Mine in the Paraopeba II Complex.

This study aligns with ongoing efforts and challenges to quantify and spatialize the consequences of the collapse-event, which have been widely discussed from various perspectives and disciplinary fields (Milanez et al., 2019). The Socio-Environmental Recovery Plan (Arcadis, 2020), required by the Judicial Agreement for Reparation and Responsibility of Vale S.A., demonstrates that the impacts extend diffusely across multiple spatial scales, from local to regional, and will require decades of research and remediation efforts.

Processes linked to globalization are embedded in this event and its geographical context, particularly considering the corporate governance regime of Vale S.A., a hegemonic company whose political action capacity assumes different forms in the local context. Before the ban on private campaign financing in 2015 (Resolution No. 23,463/2015 of the Superior Electoral Court – TSE), it was possible to more directly measure the company's political influence, as Vale S.A. was one of the leading donors to political candidates in Brazil. Among the 77 elected State Deputies of Minas Gerais in 2014, 58 (or 75%) received direct donations from mining companies (Guimarães, Milanez, Ribeiro, 2019, p. 86). With the prohibition of private campaign financing, the company's political influence has transformed.

In general, choosing (and evaluating) political representatives is a fundamental stage of democracies. Traditionally, elections are considered a key moment when voters could "punish" or "reward" representatives through their voting choices (Nicolau, 2002). Institutional arrangements significantly impact the ability of representatives to be held accountable by their constituents. However, beyond this, ultimately, "[...] it is from their worldview, their perception of their surroundings, and their daily life that the citizen—turned voter—responds, through voting, to political decisions and actions" (Castro, 2009, p. 159). In this context, Souza, Cataia, and Toledo Jr. (2002) emphasize the importance of incorporating the dimensions of "used territory" and the space of "solidary action"—the place—into political analysis, to deepen the understanding of the correlation between power and territory in the socio-spatial differentiation of votes.

Most of the impacts of the collapse-event extend beyond the tailings dispersion zone (Arcadis, 2020a), particularly when considering natural networks and flows, sociability, information, technical systems, and political-administrative structures that propagate these impacts. However, while the impacts are not confined to municipal political-administrative boundaries, the voters of Brumadinho are called upon to select political representatives within their electoral districts. Given this, it is hypothesized that the event influenced electoral choices in Brumadinho, with candidates linked to environmental issues and opposed to mining gaining more prominence, as well as political figures associated with the event in some way. Therefore, the central research question is: Did the collapse of Vale S.A.'s dam in Brumadinho (MG) lead to changes in the municipality's electoral choices?

This study seeks to trace the impact of the event on political-party preferences by analyzing shifts in voting patterns between the elections preceding (2018) and following (2022) the dam collapse. This will allow for the identification and analysis of possible correlations between the event and voters' electoral expressions. To achieve this, the study adopts political parties as institutional units, highlighting the role of individual candidates—a sine qua non condition of electoral systems with

proportional representation rules. Thus, the objective is to understand how the election results (as a reflection of politics) were affected by changes in territorial configuration after the dam collapse.

The text is divided into three sections, in addition to this introduction. First, the methodology and classification of political parties by ideology are presented. Then, the Brumadinho dam collapse is discussed as a geographical event and as the origin of a crisis, alongside changes in the profile of the local electorate. Next, the election results from 2018 and 2022, available through the Superior Electoral Court (TSE), are analyzed according to voting distribution and a political-ideological positioning metric (most-voted parties, elected candidates, a nominal analysis of selected candidates, and elections for state and federal executive positions). Finally, the concluding remarks summarize the study's findings and suggest additional analytical avenues for future research.

Methodology

The ideological classification of political parties, particularly in Brazil, is neither a unanimous task nor a simple or definitive measurement. Beyond the more explicit and programmatic ideological positions, it is necessary to consider, among other factors, the diversity of political and party articulations at different federative levels, especially the municipal level. Furthermore, as Bolognesi, Ribeiro, and Codato (2023) highlight, small and non-ideological parties are frequent in the country, which is why the authors employ a survey methodology with experts to construct their classification.

Scheeffer (2018) emphasizes that analyzing the parliamentary actions of parties by considering only one or another topic (such as the economy, the size and role of the state, or social issues) is not effective. Therefore, in his proposal, the author examines a diverse set of votes on legislative bills. In his conclusion, he notes that, although classified within the same political spectrum, parties are not necessarily similar. Meanwhile, Maciel, Alarcón, and Gimenes (2017) highlight a tendency toward centrism and the recent process of formalizing new parties. This point is important because 32 and 35 political parties participated in the 2022 and 2018 elections, respectively, reflecting both quantitative and qualitative changes in the list of parties within the analyzed territorial scope (creation, mergers, incorporations, and dissolutions). Tarouco and Madeira (2013) analyzed various methodologies for measuring party positioning and identified little variation in the classifications of Brazilian parties.
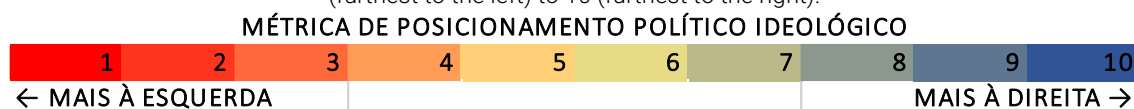
For the purposes of this research, an updated classification was sought that aligns with the adopted temporal framework and allows for comparisons between parties while providing a comprehensive view of the party system, with the caveats. The adopted metric, developed by *Folha de São Paulo* (Mariani, Yukari, Faria, 2022) (FIGURE 1), incorporates seven factors to determine political parties' positions on the ideological spectrum, taking into account various criteria discussed in the literature: (I) voting patterns of representatives in the Chamber of Deputies; (II) coalitions; (III) self-declarations by legislators; (IV) parliamentary caucuses; (V) expert opinions; (VI) party migration; and (VII) the ideological GPS of *Folha de São Paulo*, based on an analysis of followers on X (formerly Twitter).

To establish the overall classification within this metric, the seven parameters defined by *Folha de São Paulo* were combined to minimize potential biases arising from a single aspect of parliamentary political action. The results were then standardized, and parties were classified on a scale from 0 to 100. Criterion I, voting in the Chamber of Deputies, was determined based on party voting patterns. The self-declaration of legislators was derived from the research of Zucco et al. (2019), conducted in partnership between the Getúlio Vargas Foundation and the University of Oxford,

which analyzed responses from 143 legislators and calculated an average per party. The parliamentary caucus category was developed by considering 352 caucuses operating in Congress.

For the "expert opinion" category, the study utilized the work of Bolognesi et al. (2022), which aggregated the views of 519 Brazilian political scientists who classified the ideological positioning of parties on a scale from 0 (far left) to 10 (far right). Finally, Criterion VII, called the "ideological GPS," was developed based on the work of Souza et al. (2017), which applies a quantitative methodology to analyze the social media profiles of 354 federal deputies and their interactions on X (formerly Twitter).

The representatives and their parties were grouped according to a political-ideological spectrum. This grouping aims to identify possible ideological coherence between party actions and citizens' voting behavior, considering that members of the Legislative branch tend to express the representative dimension, whereas those of the Executive branch are more likely to reflect voters' evaluations of government performance (Nicolau, 2002). It is important to note that the terms "far right," "far left," and "center," used throughout the text, are relative to the adopted spectrum and do not intend to engage in a broader debate on contemporary political polarization, although they inevitably intersect with this issue.

Figure 1 – Metric for evaluating Brazilian political parties according to political and ideological factors, on a scale of 1 (furthest to the left) to 10 (furthest to the right).

Source: Adapted from the Folha de São Paulo newspaper (Mariani et al., 2022).

In a second phase, an analysis was conducted on the electoral results of both elections using the official database of the Superior Electoral Court (*Tribunal Superior Eleitoral* – TSE, 2018; 2022). The twenty most-voted State and Federal Deputies in the municipality of Brumadinho were considered (even if they were not elected), as well as the valid votes cast by Brumadinho's electorate in the first and second rounds for the State Government and the Presidency of the Republic. The candidates were grouped according to their party classification within the political-ideological positioning metric, creating tables representing the spatial dynamics of ideological shifts in voting patterns in Brumadinho during the period. Since the regulation and oversight of mining activities are primarily under state and federal jurisdiction, the election of these representatives is closely linked to the local issues experienced in Brumadinho.

In a third phase, the twenty most-voted candidates for federal and state deputy in both elections were classified to enable nominal analyses, allowing for a more detailed investigation of how these candidates addressed issues related to the dam collapse in their political platforms and how this might have influenced Brumadinho voters. For this purpose, academic articles, news reports, websites related to the subject, and official legislative databases—such as the *Legislative Assembly of Minas Gerais*, the *Chamber of Deputies*, and the *Federal Senate*—were consulted.

Throughout the text, references to candidates and parties include their position within the political-ideological positioning metric (*FIGURE 1*), identified as follows: "Candidate's Name" – "Party" – "n," where "n" represents their position on the adopted spectrum. Party acronyms follow the recommendations of the *Senate Federal Secretariat of Social Communication Manual* (*SECOM*, [n.d.]).
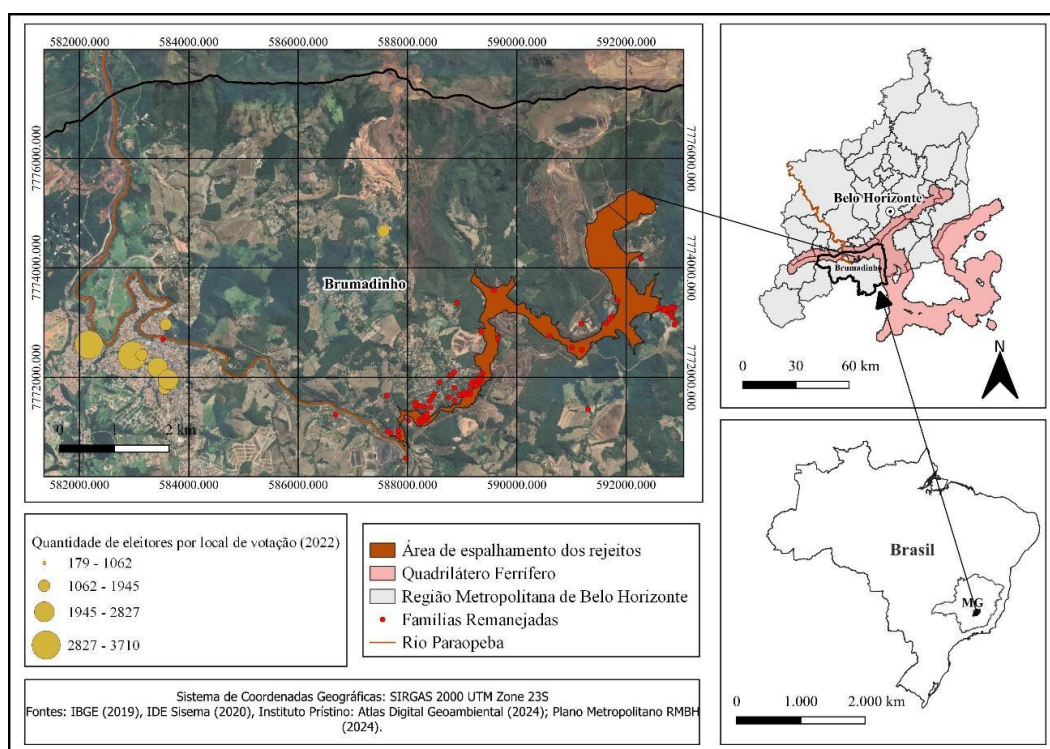
The methodological choice to analyze the most-voted candidates rather than only those elected aimed to capture the electorate's direct preferences, free from the proportional voting system's influence on electoral quotient weights. The selected timeframe includes the 2018 and 2022 elections,

as the first occurred immediately before the dam collapse (January 25, 2019), and the second took place two years, ten months, and thirteen days after the event. By assessing local voting choices within this interval, this study sought to determine whether the event constituted a factor influencing electoral change—that is, whether significant shifts in voting preferences could be observed as a possible consequence of the disaster.

The Brumadinho (MG) Disaster as a Geographical Event and Changes in the Composition of the Electorate

Brumadinho is a municipality within the Metropolitan Region of Belo Horizonte (RMBH) and forms part of the *Quadrilátero Ferrífero*, a geological region where municipalities are heavily dependent on iron ore extraction (*FIGURE 2*). In January 2019, the municipality experienced a colossal socio-environmental disaster—the collapse of the tailings dam owned by Vale S.A. The disaster left behind 12 million cubic meters of mining waste, abruptly and violently impacting the company's administrative and operational area and progressively contaminating all downstream territories, extending for at least 335 km along the Paraopeba River basin (Silveira, 2019)[4].

Figure 2 - Locational context map of the tailings spill resulting from the collapse of Dam B1 in the municipality of Brumadinho (MG)

Source: own elaboration.

The map in *Figure 2* shows Brumadinho's location in relation to the national and state territories, illustrating the spread of the tailings, which followed the course of the Paraopeba River, passing through the municipality's center and extending to other areas within and beyond the state. The map

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[4] This event occurred a few years after the collapse in Mariana (MG) of the Fundão dam, owned by the mining company Samarco (controlled by Vale S.A. and BHP Billiton) on November 5, 2015.

also highlights the areas where displaced families were relocated, particularly those who previously lived in rural zones (marked in red), and, in the urban area, the concentration of voters (marked in yellow).

One of the most comprehensive socio-environmental recovery reports produced after the disaster (Arcadis, 2020) identifies hundreds of impacts on the geographical environment, classified into three categories: *physical, biotic, and socioeconomic*. Within the *socioeconomic* category, key impacts include: loss of housing; social distress and an increase in psychological and psychosocial disorders; disruption of access roads; interference with electricity transmission services; loss of productive land and livestock; loss of private property; disruption of water supply and restricted access; disturbances to routine activities and increased inconvenience for residents; weakening of *topophilic* relationships; pressure on public services; fluctuations in tax revenue levels; unavailability of land for use; damage to the tourism, agro-pastoral, and aquaculture sectors; and an increase in respiratory and waterborne diseases. Additional environmental, social, cultural, psychological, sanitary, and economic impacts have been—and continue to be—experienced by the affected population and studied by academia (Polignano et al., 2020; Silva et al., 2020; Mayorga, 2020).

According to the socio-environmental recovery plan (Arcadis, 2020a), 665 people were directly affected by the dam collapse, while nearly the entire population was indirectly impacted due to employment ties in the production chain, proximity, and neighborhood relations. Additionally, 266 individuals were displaced. In total, 272 deaths were confirmed, the majority being workers and employees of Vale S.A. These tragic figures are reflected in the weakening of *topophilic* bonds, described as the alienation experienced by residents due to the rapid and catastrophic negative changes in their living environment following the collapse of the *Complexo Paraopeba II* dam at the *Mina Córrego do Feijão* (Arcadis, 2020a, p. 450). Another consequence was an 85.6% increase in psychological care services at *Centros de Atenção Psicossocial* (*Psychosocial Care Centers* - CAPS) between 2018 and 2019 (Arcadis, 2020a, p. 388).

Following the disaster, Brumadinho, whose economy was highly specialized and dependent on the mining sector, faced significant financial setbacks (Coelho, 2018). According to the *Municipal Planning Department of Brumadinho*, in May 2019, R$ 3.7 million in mining royalties were expected, but the actual disbursement did not exceed R$ 1.8 million (Freitas et al., 2022).

The disruptions characterizing this event stem from a broader process marked by the relaxation of environmental regulations (Zhouri, 2019), aligned with a power pact centered on commodity exports (Malheiro, Porto-Gonçalves & Michelotti, 2021, p. 51). The crisis persists in the aftermath of the disaster, particularly as negotiations with affected residents have been institutionalized under the corporation's own control—without considering the broader loss of local communities' means of social reproduction (Zhouri, 2023)—and aimed at ensuring political and economic arrangements for the continued expansion of mineral extraction in the region (Laschefski, 2020).

In this context, the collapse of the *Mina Córrego do Feijão* dam can be understood as a *geographical event*, since "where it occurs, change follows, as the event is an effective brutality" (Santos, 1996, p. 145). It is also considered a *spatial milestone* that influences voting behavior and election outcomes (Castro, 2009, p. 159). In the immediate aftermath of the disaster, various social movements, protests, and marches took place, many of which centered around discussions on environmental licensing processes, emergency plans, and dam inspection regulations (Arcadis, 2020, p. 544-546)—state functions overseen by councils, regulatory bodies, and national agencies. Therefore, after the disaster, the local political landscape expanded, incorporating these issues as political agendas with direct local implications.

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Brumadinho's electorate grew by 14.75% between 2018 and 2022 (from 28,170 to 32,326 voters), despite a decline in the total population during the same period—from 39,529 inhabitants in 2018 (IBGE estimate, 2018) to 38,915 in 2022 (IBGE, 2022). Consequently, the municipality's political representation at the state level also increased, rising from 0.18% to 0.20% (*TABLE 1*).

Table 1 – Profile of the Brumadinhense electorate

		2018	2022
Brumadinho electorate	Population - Brumadinho	39.529 (estimate)	38.915
	Total	28.170	32.326
	%	0,18%	0,20%
	Up to 29 years old	6.704 (23,8%)	7.014 (21,7%)
	Between 30 and 59 years old	15.634 (55,5%)	17.843 (55,2%)
	More than 60 years old	5.831 (20,7%)	7.467 (23,1%)
	Masculine	50%	49%
	Feminine	50%	51%

Source: Own elaboration based on data from IBGE (2018, 2022); TSE (2023).

Although larger in number in 2022, there was a slight decrease in the proportion of young voters (up to 29 years old), which dropped from 23.8% (6,704) in 2018 to 21.7% (7,014) in 2022. Most of the electorate remained in the 30 to 59 age group, with an increase in absolute numbers from 15,634 in 2018 to 17,843 in 2022, but with a slight relative change from 55.5% to 55.2%. The group of voters over 60 years old grew both in absolute numbers (rising from 5,831 to 7,467) and in percentage participation, from 20.7% to 23.1%. Regarding gender distribution, which was balanced in 2018, there was a decrease in the proportion of male voters and an increase in female participation, reaching 49% and 51%, respectively, in 2022.

Next, we analyze the election results in the municipality during the highlighted period (2018-2022), considering the territorial expression of the vote according to the electoral spectrum described in the methodology.

Results and Discussions

Analysis of Voting by Political Parties and Political Spectrum

The movement of votes by political parties and their ideological-political spectrums between the 2018 and 2022 elections was organized to highlight political-ideological shifts in the voting patterns of Brumadinho's population for the Chamber of Deputies and the Legislative Assembly of Minas Gerais, before and after the dam collapse event.

TABLE 2 presents the 20 most-voted candidates for State Deputy (on the left) and Federal Deputy (on the right) by the population of Brumadinho in each election year. Among the candidates for the state legislature, there was an increase in votes for candidates affiliated with left-wing parties, rising from two to six names in the 2022 election compared to 2018. The Workers' Party (PT) increased its representation from two candidates among the most voted in 2018 to four in 2022, while PSOL and REDE, which were not among the most voted in 2018, appeared in 2022. Thus, in the leftmost field of the political spectrum (identified as "1" in the metric, FIGURE 1), there was a significant

increase from two to six parties between 2018 and 2022. Additionally, there was an increase from one to two parties in votes for far-right candidates (PSC and PL, classified as "10" in the metric).

Tabela 2 – Party Representation of the 20 Most-Voted Legislative Candidates in Brumadinho (MG), with Identification of Positioning in the Ideological Political Spectrum (2018-2022)

LEGISLATIVO ESTADUAL				LEGISLATIVO FEDERAL			
2018		**2022**		**2018**		**2022**	
EP	PARTIDO	EP	PARTIDO	EP	PARTIDO	EP	PARTIDO
2	PT	1	PSOL	1	PSOL	1	PSOL
	PT	2	PT	2	PT	2	PT
3	PV		PT		PT		PT
	PV		PT	3	PSB	3	PV
	PSB		PT		PV		PDT
	PDT		REDE	4	AVANTE	4	AVANTE
4	PPS	3	PV	5	MDB		AVANTE
	SOLID.		PDT		PROS		AVANTE
5	MDB	4	AVANTE		PTC		AVANTE
	PTC	5	PSD	7	PODE	5	PSD
7	PRB		PROS		PSDB	7	PSDB
	PRB		REPUB.		PRB		REPUB.
	PSDB	7	REPUB.		PODE	9	PATRIOTA
	PSDB		PSDB		PRB		PATRIOTA
8	DC	8	PRTB		PSDB		PATRIOTA
	PRTB	9	PP	9	PP		PP
9	DEM		UNIÃO		PATRIOTA		UNIÃO
	PSL		UNIÃO		PSL	10	PL
	PTB	10	PL		PSL		PL
10	PSC		PSC	10	PR		PL

Source: Own elaboration based on data from TSE (2018; 2022).

Parties on the right side of the ideological spectrum (classified between 7, center-right, and 9, extreme right) maintained their participation, such as Republicanos (formerly PRB), PSDB (with one less most-voted candidate), DC (Democracia Cristã), PRTB, PP, and União Brasil (formed from the merger of PSL with DEM – Democratas). Finally, the general movement resulted in the loss of seats occupied by PV and PSB, classified as 3 (left-wing parties), to more left-wing parties. There was also a decline in votes for center-left candidacies (4), which in 2022 had only Avante for the State Legislature, while the center (classified as 5) maintained two candidates among the most-voted.

It is important to note that the movement of votes for the State Legislature during the highlighted period is also significant when we evaluate the percentage of votes received by each segment of the political spectrum. The far-left segment (parties classified from 1 to 3 - PT, PV, PSB, PDT) accounted for 18.8% of the votes in 2018, while in 2022 it received 29% of the valid votes, a gain of more than 10 percentage points. Meanwhile, the right (parties classified from 8 to 10 - DC, PRTB, DEM, PSL, PTB, PSC) accumulated 12.08% of the votes in 2018 and 17.61% in 2022, an increase of just over 5 percentage points, half of what was recorded by the left. Furthermore, the center (parties classified

from 4 to 7 - PPS, Solidariedade, MDB, PTC/AGIR, Avante, PSD, PROS) increased from 8.19% to 15.58% between the two elections despite the lower representativeness of these parties in 2022.

In 2018 election, the 20 most-voted candidates in Brumadinho for the State Legislature received 48.12% of the valid votes in the municipality. In 2022, this number was 17 percentage points higher, and the 20 most-voted candidates concentrated 65.29% of the votes of the local electorate. In 2018, the top five candidates concentrated 25.65% of the valid votes, and the top three, 16.86%. In 2022, these concentrations increased even further: the top five most-voted concentrated 47.01% of the municipal votes, and the top three, 38.63%. Therefore, Brumadinho's voters concentrated their votes on a smaller number of candidates for State Deputies after the event-break, a factor that, together with the 14.75% increase in the voting electorate (TABLE 1), helps explain the rise in votes for the highest-voted candidates across all spectrums, with left-wing leadership, both in the number of seats occupied and in vote concentration.

For Federal Deputies, represented on the right side of Table 2, there was a significant increase from the left-wing field (classified from 1 to 3 in the metric, i.e., PSOL, PT, PV, PDT). If we consider the rise of the Avante party (4, center to center-left), which went from one candidate among the most-voted in Brumadinho in 2018 to four candidates in 2022, a significant shift can be observed. Similarly, candidates from parties further to the right of the political-ideological spectrum had a considerable increase, going from five in 2018 to eight candidates among the most-voted in Brumadinho in 2022. Consequently, parties positioned more centrally on the spectrum (here included those rated 5 – center – and 7, center-right) lost positions, going from nine to only three candidates in the ranking of the most-voted in Brumadinho.

In terms of the percentages recorded by each political spectrum, it can be seen that, among the 20 most-voted candidates, the right (Patriota, PP, PSL/União Brasil, and PR/PL) accumulated 18.26% of the valid votes in 2018 and 42.95% in 2022, an increase of nearly 25 percentage points. On the other hand, left-wing parties decreased from 27.95% to 18.52% of the valid votes during the period, despite maintaining the same number of seats occupied in 2018. The Avante party, which had only 1.4% of the votes in 2018, received virtually all the center votes in 2022, totaling 12.27% of the votes in Brumadinho.

On the other hand, other center parties (MDB, PROS/Solidariedade, PTC, and PSD) lost space, as did center-right parties (classified as 7 – Podemos, PSDB, and PRB/Republicanos), which went from six candidates among the top 20 in 2018 to only two in 2022. While the 20 most-voted candidates in 2018 concentrated 56.4% of the votes, in 2022 the concentration was nearly 18 percentage points higher, reaching 74.33%. Thus, Brumadinho voters also concentrated their votes for Federal Deputy after the event-break.

Finally, examining the graphic representation (TABLE 2) reveals a growth of parties located at the extremes of the political-ideological spectrum metric. Furthermore, it was also noted that the diversification of votes decreased, both in the context of the State Legislature and the Federal Legislature, demonstrating that for most of the political spectrum, the polarization of the 2022 election also expressed itself in terms of an intensified concentration of votes among the candidates. However, it is important to maintain a methodological caveat regarding the concept of political polarization in Brazil (Ortellado, Ribeiro, Zeine, 2022), a topic more closely tied to the national election and its direct transposition to different local elections.

Analysis of the Voting in State and Federal Legislatures by Candidacies and Political Spectrum

In the detailed breakdown of the 20 most-voted candidates for the State and Federal Legislatures in Brumadinho based on their ballot names, it is possible to track with greater precision the movement of some candidates before and after the event-break. Tables 3 and 4 present the nominal voting in descending order of votes for each sphere of representation.

When comparing the votes of 2018 and 2022 for the State Legislature, there is a noticeable increase in the number of candidates on the left side of the spectrum (reddish tones), especially among those in positions 10 to 20 of the most-voted candidates by the municipality's population. The number of candidates increased from one to five during this period. Among the top ten most-voted, however, there is a shift toward the right side of the political spectrum (bluish tones), with candidates increasing from two to three.

Table 3 – 20 Most Voted Candidates in Brumadinho (MG) for State Deputy in Minas Gerais, by Party and Political Spectrum (EP), in Descending Order, in the 2018 and 2022 Elections

	20 MAIS VOTADOS PARA O LEGISLATIVO ESTADUAL - BRUMADINHO (MG)						
	2018				**2022**		
	NOME DE URNA	*	PARTIDO	EP	NOME DE URNA	*	PARTIDO	EP
1º	JOÃO VITOR XAVIER DA ITATIAIA	*	PSDB	7	MÁRIO HENRIQUE CAIXA	*	PV	3
2º	MÁRIO HENRIQUE CAIXA	*	PV	3	BRUNO ENGLER	*	PL	10
3º	MAURO TRAMONTE	*	PRB	7	ADALCLEVER LOPES		PSD	5
4º	AGOSTINHO PATRUS	*	PV	3	BEATRIZ CERQUEIRA	*	PT	2
5º	IONE PINHEIRO	*	DEM	9	KLEBINHO REZENDE		PROS	5
6º	MARILIA CAMPOS	*	PT	2	AMILTON BRUMADINHO		PRTB	8
7º	ANTONIO JORGE		PPS	4	IONE PINHEIRO	*	UNIÃO	9
8º	FIGENINHA BIBIANO		PSB	3	CARLOS HENRIQUE	*	REPUB.	7
9º	DAMÁSIO CARVALHO		DC	8	LUIZA DULCI		PT	2
10º	BEATRIZ CERQUEIRA	*	PT	2	BIM DA AMBULÂNCIA	*	AVAN.	4
11º	IRAN BARBOSA		MDB	5	ANDREIA DE JESUS	*	PT	2
12º	ALENCAR DA SILVEIRA JR.	*	PDT	3	ALENCAR DA SILVEIRA JR	*	PDT	3
13º	CÉLIO MOREIRA		PTC	5	BETO ALEGRIA		REDE	2
14º	CARLOS HENRIQUE	*	PRB	7	JOÃO LEITE		PSDB	7
15º	BRUNO ENGLER	*	PSL	9	NORALDINO JÚNIOR	*	PSC	10
16º	DR. PAULO TELLES		PRTB	8	BELLA GONÇALVES	*	PSOL	1
17º	ALBERTO P. COELHO - BETINHO	*	SOLID.	4	MAURO TRAMONTE	*	REPUB.	7
18º	SARGENTO RODRIGUES	*	PTB	9	INSTRUTOR REINALDO		PP	9
19º	NORALDINO JUNIOR	*	PSC	10	MACAÉ EVARISTO	*	PT	2
20º	JOÃO LEITE	*	PSDB	7	BICHÃO DE BRUMADINHO		UNIÃO	9

*Elected Candidates
Source: Own elaboration based on data from TSE (2018; 2022).

There was also a loss of positions by parties closer to the center, which went from eight to six candidates between 2018 and 2022. This process is exemplified by the rise in positions of left-wing candidate Beatriz Cerqueira (PT – 2), who moved from the 10th position, with 331 votes, in 2018, to

the 4th position, with 879 votes, in 2022, in Brumadinho. Similarly, right-wing candidate Bruno Engler[5] (who switched from PSL – 9 to PL – 10 during the period) moved from the 15th position in 2018, with 256 votes, to the 2nd position in 2022, with 2,176 local votes.

In 2022, State Deputy Bruno Engler, coordinator of the Movimento Direita Minas, defended the legality of the Taquaril Mineração S.A. (Tamisa) enterprise, a controversial operation in Belo Horizonte, located in the Serra do Curral (Munhoz, 2022). On the other hand, Beatriz Cerqueira is a public figure opposed to unregulated and illegal mining and is dedicated to issues related to the socio-environmental consequences of these enterprises in the state of Minas Gerais (ALMG, 2022). She is particularly active in municipalities of the Quadrilátero Ferrífero, such as Brumadinho and the capital, Belo Horizonte. According to the institutional repository of the Legislative Assembly, from 2019 to 2022, the Deputy was responsible for proposing ten bills related to dam safety, environmental damage caused by mining activities, protection of green areas, fauna, flora, and water resources, as well as traditional communities and those affected by dams (ALMG, 2022).

In the center-right, candidate João Vítor Xavier da Itatiaia (PSDB – 7, later Cidadania – 4) held the 1st position among the most-voted candidates in 2018 and dropped to the 22nd position in 2022. Mauro Tramonte[6] (Republicanos – 7) was moved from the 3rd to the 17th position between the two elections (TABLE 3).

Two other candidates stand out among the most voted in 2022 for having "Brumadinho" in their ballot names, indicating a toponymic association with the territory, possibly aiming to gain some political capital. Amilton Brumadinho (PRTB – 8) ranked 6th (with 2% of the total valid votes) but was not elected due to the electoral threshold. The second, Bichão de Brumadinho (União Brasil – 9), reached the 20th position (0.87% of the votes) in a list of over 1,100 candidates but was elected only as a substitute. The practice of using place names in ballot names is common in elections with an open-list proportional electoral system, as in the Brazilian case, reinforcing personal characteristics of candidates (such as nickname, profession, and place of origin) in search of visibility and votes in a defined geographic context (Agnew, 1996; Manin, 1997; Tozi; Duarte, 2023).

Still on this topic, Azevedo (2023, p. 15), when analyzing surveys addressing the so-called "friends and neighbors' effect," highlights the power of localism in voters' choices, who may even set aside ideological and party differences to elect candidates with whom they feel closer and/or identify with in terms of origin. In other words, candidates linked to their local roots, a phenomenon that candidates Bichão de Brumadinho and Amilton Brumadinho seem to have sought to reinforce in their ballot names.

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[5] Bruno Engler (PL) ran for Mayor of Belo Horizonte (MG) in 2024, receiving the highest number of votes in the first round with 34.28% of valid votes. He obtained 47% of the votes in the second round but lost the election to Fuad Noman (PSD – 5, center), who received 53% of the votes.
[6] Mauro Tramonte (Republicanos) ran for Mayor of Belo Horizonte (MG) in 2024. He was the third most voted candidate, receiving 15.15% of the votes in the first round.

Tabela 4 – 20 Most Voted Candidates in Brumadinho (MG) for Federal Deputy in Minas Gerais,
in the 2018 and 2022 Elections

	20 MAIS VOTADOS PARA O LEGISLATIVO FEDERAL - BRUMADINHO (MG)							
	2018				2022			
	NOME DE URNA	*	PARTIDO	EP	NOME DE URNA	*	PARTIDO	EP
1°	MARCELO ALVARO ANTONIO	*	PSL	9	PEDRO AIHARA	*	PATRIOTA	9
2°	LAUDIVIO CARVALHO		PODE	7	NIKOLAS FERREIRA	*	PL	10
3°	CAIO NARCIO		PSDB	7	JULIO DELGADO		PV	3
4°	PINHEIRINHO	*	PP	9	GREYCE ELIAS	*	AVANTE	4
5°	CORONEL BIANCHINI		PRB	7	DUDA SALABERT	*	PDT	3
6°	BRUCE MARTINS		PODE	7	ROGÉRIO CORREIA	*	PT	2
7°	AUREA CAROLINA	*	PSOL	1	LUIS TIBÉ	*	AVANTE	4
8°	DUILIO DE CASTRO		PATR.	9	AÉCIO NEVES	*	PSDB	7
9°	JULIO DELGADO	*	PSB	3	ANDRÉ JANONES	*	AVANTE	4
10°	ROGÉRIO CORREIA	*	PT	2	CÉLIA XAKRIABÁ	*	PSOL	1
11°	LEONARDO QUINTÃO		MDB	5	GILBERTO ABRAMO	*	REPUB.	7
12°	EROS BIONDINI	*	PROS	5	TUNICO CALDEIRA		PATRIOTA	9
13°	GILBERTO ABRAMO	*	PRB	7	PINHEIRINHO	*	PP	9
14°	PATRUS ANANIAS	*	PT	2	PATRUS ANANIAS	*	PT	2
15°	CABO JUNIO AMARAL	*	PSL	9	FRED COSTA	*	PATRIOTA	9
16°	ANDRE JANONES	*	AVANTE	4	MAURICIO DO VOLEI	*	PL	10
17°	LINCOLN PORTELA	*	PR	10	BRUNO FARIAS	*	AVANTE	4
18°	ANDERSON RACILAN		PV	3	ÁLVARO DAMIÃO		UNIÃO	9
19°	JULIANO LOPES		PTC	5	STEFANO AGUIAR	*	PSD	5
20°	AÉCIO NEVES	*	PSDB	7	LINCOLN PORTELA	*	PL	10

*Candidatos eleitos
Fonte: Elaboração própria com base em dados do TSE (2018; 2022).

In the analysis of the Federal Legislature (2018-2022), among the top 10 most voted in Brumadinho (TABLE 4), there is a noticeable increase in the number of left-leaning parties in 2022, reaching seven out of the ten most voted candidates. Between the 11th and 20th positions, a clear concentration of candidates from the far-right is evident (increasing from two to six candidates in the municipality). In contrast, in 2018, the configuration was more heterogeneous, with an emphasis on right-wing parties (identified as 7 on the political spectrum).

In the 2022 elections, the top two positions were occupied exclusively by candidates from right-wing parties: Pedro Aihara (Patriota – 9, who received 21.94% of the votes from Brumadinho) and Nikolas Ferreira (PL – 10, who received 16.16% of the votes). Nikolas Ferreira was the Federal Deputy with the highest vote count in the country (1.47 million votes). In 2020, still affiliated with PRTB, Nikolas Ferreira was the second most voted city councilor for the Belo Horizonte City Council (29,388 votes). Pedro Aihara's candidacy was solidified with 84,804 votes in the state, and until months before the election, he was part of the Minas Gerais Military Firefighters Corps as a First Lieutenant. The extensive media coverage on the rescue and assistance to victims portrayed this professional category as "heroes."[7] Aihara gained notoriety for his frequent appearances as the spokesperson for

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[7] An example of this media treatment surrounding his public figure is the interview given by Lieutenant Freitas (2019), in which he states: "'What I do is simply convey the work of these great heroes'."

the corps after the dam rupture in 2019. It is worth noting that from 2021 onwards, the congressman was a student and now acts as one of the leaders of RenovaBR, an organization focused on training "political and public leaders for a fairer and less unequal Brazil" (RenovaBR, 2024).

Mining-related themes and the dam collapse explicitly permeate the careers of other candidates for the Federal Legislature, such as Júlio Delgado (PV – 3, 3rd position with 8.82% of Brumadinho's votes in 2022 but was not elected) and Rogério Correia[8] (PT – 2, 6th position with 3.09% of the votes in 2022). After being elected in 2018, both acted as leaders in the Parliamentary Inquiry Commission on Brumadinho: the former as President and the latter as rapporteur. Both candidates improved their vote count in Brumadinho when comparing the 2022 results to those of 2018. Júlio Delgado, still in PSB (3 on the political spectrum), moved from the 6th position to the 3rd, but did not get re-elected in 2022. Rogério Correia moved from the 10th to the 6th position and was elected.

Additionally, Célia Xakriabá (PSOL – 1, 10th position with 1.55% of the votes in 2022) and Duda Salabert[9] (PDT – 3, 5th position with 4.12%) are public figures involved in the parliamentary fight against irregular mining in Minas Gerais, particularly in Brumadinho (Rocha, 2022). Duda Salabert was the most-voted city councilor in the history of the capital, with 37,613 votes in 2020, gaining prominence in the Environment Committee of the Belo Horizonte City Council and presenting 24 proposals related to mining (CMBH, 2022).

There was also a significant increase in candidates affiliated with Avante (4, center to center-left), including André Janones (1.68% of Brumadinho's votes in 2022), who played a prominent role in Luiz Inácio Lula da Silva's presidential campaign that year through his actions on social media. Luis Tibé also stood out with his vote count in 2022 (7th position, with 2.34% of the votes). The deputy was a member of the External Commission titled "Brumadinho Disaster," created to follow the developments of the event. He was also a member of the Permanent Commission of Mines and Energy of the Chamber of Deputies (Chamber of Deputies, [s.d.]) during the investigation of the disaster.

However, other candidates such as Greyce Elias (Avante – 4, center to center-left, 4th position with 7.57% of the votes in 2022), despite belonging to more left-wing parties, engage in actions defending mining companies. The first was the rapporteur in 2021 for the working group responsible for updating the Brazilian mining code (Decree-Law No. 227/67), which relaxed various procedures in favor of mining companies (Chamber of Deputies, 2021b). The Deputy voted in favor, in 2021, of amendments to the proposal for the General Environmental Licensing Law in the Chamber of Deputies, Bill No. 3729/2004 (Chamber of Deputies, 2021a), and in the Federal Senate, Bill No. 2,159/2021 (Senate, 2024), amendments that allowed the controversial self-licensing for environmental purposes. Thus, as emphasized in the initial theoretical-methodological debate, ideological positioning in Brazil should not be understood with a rigid and definitive framework, but rather by considering the scalar variations in political actions, as their personal and local nuances reveal a "multilayered" political landscape.

The Expression of Brumadinho Voter Preferences for the State and Federal Executive

The results of the 2018 state executive elections in Brumadinho reveal a concentration of votes that mirrors the state-level results, with the top two candidates being the main contenders for the

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[8] Rogério Correia (PT) se lançou candidato a Prefeito de Belo Horizonte (MG) em 2024 e recebeu 4,40% dos votos, no primeiro turno, ficando em sexto lugar na disputa.
[9] Duda Salabert (PDT) ran for Mayor of Belo Horizonte (MG) in 2024, finishing in fifth place with 7.70% of the votes.

second round. The first round was led by two right-wing candidates: Romeu Zema (Novo – 10, with 43.47%), followed by Antonio Anastasia (PSDB – 7, with 33.16%). The most voted left-wing candidate, Fernando Pimentel (PT – 2, with 17.06%), was the Governor of Minas Gerais seeking re-election. Previously, he had served as vice-mayor and mayor of Belo Horizonte (MG). There were also three other candidates from left-wing parties (who collectively accounted for 3.23% of the votes in Brumadinho) and two from center parties (with 3.05%).

Table 5 – Most Voted Candidates in Brumadinho (MG) for Governor of Minas Gerais,
in the First and Second Rounds of the 2018 Election, and in the Single Round of 2022

GOVERNO DE MINAS GERAIS							
2018				**2022**			
2° TURNO				TURNO ÚNICO			
NOME DE URNA	*	**PARTIDO**	EP	**NOME DE URNA**	*	**PARTIDO**	EP
ROMEU ZEMA (74,38%)	*	NOVO	10	KALIL (49,42%)		PSD	5
ANTONIO ANASTASIA (25,62%)		PSDB	7	ZEMA (39,22%)	*	NOVO	10
1° TURNO				CARLOS VIANA (9,48%)		PL	10
ROMEU ZEMA (43,47%)	2T	NOVO	10	MARCUS PESTANA (0,91%)		PSDB	7
ANTONIO ANASTASIA (33,16%)	2T	PSDB	7	LORENE FIGUEIREDO (0,33%)		PSOL	1
FERNANDO PIMENTEL (17,06%)		PT	2	CABO TRISTAO (0,19%)		PMB	8
ADALCLEVER LOPES (2,70%)		MDB	5	VANESSA PORTUGAL (0,18%)		PSTU	1
DIRLENE MARQUES (2,25%)		PSOL	1	INDIRA XAVIER (0,15%)		UP	1
JOÃO BATISTA MARES GUIA (0,81%)		REDE	2	RENATA REGINA (0,07%)		PCB	2
CLAUDINEY DULIM (0,35%)		AVAN.	4	LOURDES FRANCISCO (0,05%)		PCO	1
JORDANO METALÚRGICO (0,21%)		PSTU	1				

Elected candidate
Source: Author's own elaboration based on data from the TSE (2018; 2022).

However, after the rupture event, in 2022, the majority of Brumadinho's population voted in a manner opposite to that of the state, opting for a centrist candidate (Alexandre Kalil, PSD – 5, who received 49.42% of the votes) instead of the re-election of Romeu Zema (NOVO – 10), who received 10 percentage points less. Another candidate from an extreme-right party, Carlos Viana (PL – 10), received 9.48% of the votes in the municipality.

At the state level, Zema, re-elected in the first round, was victorious with 56.18% of the votes, followed by Kalil, with 35.08%. Carlos Viana received 9.48% of the state votes. This election also featured: five left-wing candidates (who together received only 0.78% of the votes in Brumadinho); two centrist candidates (with 50.83%), one less than in the previous election; and three right-wing candidates, who, despite being the majority, received fewer votes in Brumadinho than in the previous election (48.89%).

Comparing the first and second rounds of 2018 with the single round of 2022, the re-elected governor, Romeu Zema, showed declines of 25.17% and 4.25%, respectively (TABLE 5), in Brumadinho. There are certainly multiple factors behind this decline in his votes, including the fact that Zema was the governor at the time of the dam rupture. His narrative about the event downplayed Vale S.A.'s responsibility, adopting a more conciliatory and permissive stance regarding the damage caused by the company (Teixeira, et al., 2020). His policies favoring the advancement of mining in the

state, through the relaxation of environmental protection (Freitas; Melo, 2023), may have also contributed to the loss of votes observed.

An example is the extensive discussion surrounding the mineral exploration of the Serra do Curral, located in Belo Horizonte, supported by Zema (Novo - 10) and criticized by Kalil (PSD - 5), who advocated for the protection of Serra (Vasconcelos, 2022). Another related topic is the relativization of Vale S.A.'s responsibility regarding the Brumadinho dam rupture, which Zema defended (Hora do Povo, 2019), while Kalil recognized the event as a crime in Brumadinho (Lima, 2019). Zema also became notorious for his public sector reduction measures, weakening environmental oversight agencies (Fiúza; Pimentel, 2020), contrasting with Kalil's campaign advocating for economic diversification and environmental preservation (Sampaio, 2022).

In the 2018 presidential election, the results in Brumadinho followed those of Minas Gerais (Bolsonaro – 46.03% and Haddad – 29.28%) and the country (Bolsonaro – 48.31% and Haddad – 27.65%), but with a more significant difference between the two candidates, of 32.27 percentage points. The 2018 election had six left-wing candidates (who received 36.27% of the votes in Brumadinho), four from the center (with 10.32%), and three from the right (who received 53.43% of the votes).

In the first round of the 2022 election, the left (with one less candidate compared to 2018) summed 49.93% of the valid votes, an increase of 13.66 percentage points compared to 2018. The center, with only one candidate, received 5.86% of the votes, and the right, with five candidates, received fewer votes than in 2018, totaling 44.21% of the votes in the municipality. It is important to note that, while the ideological profile of left-wing candidates remained stable, there was a reduction in center candidates, making way for more extreme-right candidates. Thus, in 2018, there were three candidates classified as 7 (PSDB and Podemos), who gave way, in 2022, to a stronger representation of the extreme right, with four parties classified as 9 (União Brasil and PTB) and 10 (PL and Novo) in the metric.

Tabela 6 - Most Voted Presidential Candidates in Brumadinho (MG), in the Single Round of 2018 and in the First and Second Rounds of 2022

PRESIDÊNCIA DA REPÚBLICA							
2018				**2022**			
TURNO ÚNICO				2° TURNO			
NOME DE URNA	*	PARTIDO	EP	NOME DE URNA	*	PARTIDO	EP
JAIR BOLSONARO (52,24%)	*	PSL	10	LULA (49,18%)	*	PT	2
FERNANDO HADDAD (19,97%)		PT	2	JAIR BOLSONARO (50,82%)		PL	10
CIRO GOMES (14,32%)		PDT	3	1° TURNO			
GERALDO ALCKMIN (4,51%)		PSDB	7	LULA (46,77%)	2T	PT	2
JOÃO AMOÊDO (4,24%)		PSDB	7	JAIR BOLSONARO (43,02%)	2T	PL	10
MARINA SILVA (1,36%)		REDE	2	SIMONE TEBET (5,86%)		MDB	5
HENRIQUE MEIRELLES (1,17%)		MDB	5	CIRO GOMES (3,05%)		PDT	3
CABO DACIOLO (1,14%)		PATR.	9	FELIPE D'AVILA (0,59%)		NOVO	10
GUILHERME BOULOS (0,49%)		PSOL	1	SORAYA THRONICKE (0,52%)		UNIÃO	9
ALVARO DIAS (0,40%)		PODE	7	PADRE KELMON (0,07%)		PTB	9
VERA (0,08%)		PSTU	1	LÉO PÉRICLES (0,07%)		UP	1
EYMAEL (0,05%)		DC	8	SOFIA MANZANO (0,02%)		PCB	2
JOÃO GOULART FILHO (0,05%)		PPL	2	VERA (0,02%)		PSTU	1
				CONSTITUINTE EYMAEL (0,01%)		DC	8

Source: Author's own elaboration based on data from the TSE (2018; 2022).

In the 2018 national elections (single round – TABLE 6), Brumadinho's population cast 52.24% of their votes for the candidate Jair Bolsonaro (PSL/PL – 10), who also won at the state and federal levels. The 2022 election, however, was marked by the defeat of Jair Bolsonaro at the state and national levels in the second round, but not in Brumadinho, where the far-right candidate received 1.64% more votes than Luís Inácio Lula da Silva (PT - 1). In the first round, Lula received more votes than Bolsonaro, but the reversal in the second round can likely be explained by a traditional vote realignment between rounds, considering the 5.86% of votes received by Simone Tebet (MDB – 5, center), plus those from the other four right-wing candidates, which together totaled 7.05% of the votes in the first round—just under the 7.8% by which Bolsonaro increased his votes in the second round of 2022. The same occurred with Lula, who experienced a smaller vote transfer than Bolsonaro, possibly gaining votes from Ciro Gomes (PDT – 3, center-left), who received 3.05%, and from the other left-wing candidates, who collectively received only 0.09% of the votes in the municipality. Ultimately, just like in the state executive election, the presidential election results in Brumadinho reflect the intensification of political polarization among the local population.

Conclusion

This study aimed to understand the impacts of the Vale dam rupture in Brumadinho as a geographical event and the implications of this event on the electoral geography of the municipality, based on the ideological spectrum of the most voted parties, particularly for the State and Federal Legislative (2018 and 2022). The analyses indicate important results that relate the rupture event to significant changes in Brumadinho's voting patterns.

In the analysis of the State Legislative parties, there was an increase in the left-wing field (parties classified as 1, 2, and 3), going from six to eight candidates among the top 20 most voted. The right-wing field (8, 9, and 10) did not show quantitative changes, maintaining six candidates among the top 20, but there were qualitative changes in this composition, given the increase in far-right candidates, going from one in 2018 to two in 2022 among the 20 most voted. Among the names in the State Legislative election, there was a toponymic association, as seen in the cases of Hamilton Brumadinho (PRTB – 8) and Bichão de Brumadinho (União Brasil – 9). Resistance discourses against neo-extractivism were represented in the rise of Beatriz Cerqueira (PT – 1).

In the context of the Federal Legislative, the left maintained five candidates among the most voted, but the right increased its representation by three candidates in the top 20 during the analyzed period. Of these, two were from the far right, which collectively went from one candidate in 2018 to three among the most voted in 2022. The name Pedro Hayara highlights the connection between local action (such as his work as a firefighter) and the rupture event. Also, Júlio Delgado (PV – 3), Rogério Correia (PT – 1), Célia Xakriaba (PSOL – 1), and Duda Salabert (PDT – 3) exemplify the rise of left-wing candidates committed to anti-mining agendas and their tragic regional consequences, reinforcing ideas developed earlier in the study.

Therefore, for both legislative chambers, there was a notable increase in left-wing voting expression in the population, with a focus on political figures who had the fight against mining and the rupture event as central themes. One key element for these results may be the politicization of the mining issue and its governance system immediately after the rupture event, as noted in the Arcadis Socio-Environmental Recovery Plan (2020).

At the same time, parties on the far-right also strengthened in 2022, taking over the traditional right-wing space (more centrist), with a focus on Bruno Engler (PL – 10), elected State Deputy, and

Nikolas Ferreira (PL – 10), a Belo Horizonte City Councilor and later elected Federal Deputy. Both were the second-most voted in Brumadinho that year, in their respective spheres (State and Federal). The executive elections also illustrated the increase in political polarization and significant shifts between the right and the left. In 2018, the contest for the state government was between two right-wing parties (Anastasia – PSDB and Zema – Novo), and the farthest right candidate won. In the 2022 election, however, the contest was between the far-right (Zema, from Novo) and a coalition of the center and left (Kalil from PSD, with PT, PCdoB, PV, PSB). Alexandre Kalil's vote finished more than 10 percentage points ahead of Romeu Zema in Brumadinho, unlike the state's overall result, where Zema won. In the presidential race, the subtle trend observed among the top 20 most voted at the state level was confirmed, with the left-wing candidate (Lula – PT) showing an increase in the percentage of votes from 2018 to 2022.

In summary, the analyses revealed an increase in Brumadinho's population vote for candidates at the extremes of the ideological spectrum, to the detriment of votes for more centrist parties. These processes align with a broader trend observed in presidential elections and have been analyzed as an increase in political polarization in Brazil. There would then be a certain correspondence between local and national voting patterns, although the polarization of votes does not necessarily imply a polarization of political opinions at the local level, considering the effects of neighborhood influence, local interests, and urban care in the elections analyzed.

Although not considered in this analytical framework, the elections for municipal executive also present results that correlate with the rupture event and the manifestation of voting behavior. In 2016, the two most-voted candidates were from parties that made environmental issues a central theme. Avimar de Melo Barcelos (PV – 3 in the ideological metric, who had previously served as Mayor from 2009 to 2012) won the election with 55.11% of valid votes against Marcelo Gouvêa Teixeira (REDE – 2, who received 24.8% of the votes). In the 2020 election, more than a year after the rupture event, the Mayor was re-elected with 56.95% of valid votes.

In the 2024 municipal election, the candidate supported by the Mayor, Guti da Premoldados (Avante – 4), lost with 41.63% of valid votes to Gabriel Augusto Viotti Parreiras (46.25% of the votes) from the Partido Renovação Democrática (PRD), resulting from the merger of Patriotas and Partido Trabalhista Brasileiro (both classified as 9 on the ideological scale). Gabriel Parreiras founded the Associação Amigos de Brumadinho in 2019, an organization created to promote solidarity actions, which is still active. This context offers new insights into a geographical situation marked by the reorganization of power dynamics in Brumadinho following the rupture event.

The research also highlighted the need for specific investigations to deepen the understanding of the rupture event's consequences on local and regional electoral geography, given the limitations of the methodology used here. One such area is the presence of four candidates for the Mayor of Belo Horizonte among the most-voted (and elected) candidates in Brumadinho in 2022, including two State Deputies (Bruno Engler, PL, and Mauro Tramonte, Republicanos) and two Federal Deputies (Rogério Correia, PT, and Duda Salabert, PDT). These candidacies indicate regionalization practices in candidacies and mandates, taking into account both the Greater Belo Horizonte Metropolitan Area (RMBH) and the Iron Quadrangle mining region.

Finally, the decrease in the municipal population during this period, in light of the increase in the number of voters—especially in age groups over 60 (28% increase) and 30 to 59 years (14.13% increase)—also deserves further research. This inverse relationship stands out in a context of economic stagnation caused by the disaster but with a significant political space in the municipality.

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