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Negative affects of the Estreito Hydroelectric Plant – Maranhão (UHE-MA) on the population growth of impacted municipalities

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Resumo
A Usina Hidrelétrica de Estreito–Maranhão (UHE-MA) é um empreendimento energético localizado no rio Tocantins, operando desde 2011, pertencente ao Consórcio Estreito Energia (CESTE) e impacta diretamente 12 municípios entre os estados do Tocantins e Maranhão, com repercussões sociais, ambientais e demográficas. Neste texto, objetivamos analisar os impactos negativos da Usina Hidrelétrica de Estreito no crescimento populacional, destacando a diminuição e o envelhecimento da população relacionados aos processos de desapropriação e deslocamento forçado. A construção e operação da UHE-MA alteraram a dinâmica demográfica e as condições de vida das comunidades afetadas, motivo pelo qual incorporamos uma análise qualitativa e quantitativa dos dados entre 2010 e 2025. O estudo foi fundamentado na Teoria dos Afetos, especialmente nas contribuições de Espinosa (2024) e Deleuze (2002), para interpretar os efeitos emocionais e existenciais da desapropriação; na Teoria da Transição Demográfica, que subsidia a compreensão das alterações na estrutura etária; e na Teoria da População em Marx, que relaciona essas mudanças às contradições do modo de produção capitalista. Metodologicamente, a pesquisa utiliza dados oficiais do IBGE (2025) e SIDRA (2025), organizados por meio de estatística descritiva e representados geoespacialmente via *software* QGIS, considerando 12 municípios diretamente impactados pela UHE. Os resultados indicam declínio populacional significativo, com destaque para Babaçulândia, que apresentou redução de 24,4% entre 2010 e 2022, além de expressivo envelhecimento demográfico. O artigo evidencia que os impactos da UHE vão além das dimensões econômicas, produzindo afetos negativos que reduzem a potência de agir e existir dos indivíduos e coletividades afetadas.

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Palavras–chave: Afetos. Usina Hidrelétrica. Crescimento populacional. Babaçulândia.

Affections of the Estreito Hydroelectric Plant – Maranhão (UHE-MA) on the Population Dynamics of Impacted Municipalities

Abstract
The Estreito Hydroelectric Plant – Maranhão (UHE-MA) is a power facility on the Tocantins River, operating since 2011, owned by the Estreito Energia Consortium (CESTE), which directly affects 12 municipalities across Tocantins and Maranhão, with social, environmental, and demographic repercussions. This article analyzes the negative impacts of the UHE-MA on population growth, highlighting population decline and aging linked to expropriation and forced displacement. The plant's construction and operation altered demographic dynamics and living conditions in affected communities; therefore, we combine qualitative and quantitative analyses for 2010–2025. The study is grounded in the Theory of Affects, especially Spinoza (2024) and Deleuze (2002), to interpret the emotional and existential effects of expropriation; in Demographic Transition Theory, which supports understanding age-structure shifts; and in Marx's Theory of Population, which relates these changes to contradictions inherent to the capitalist mode of production. Methodologically, we use official IBGE (2025) and SIDRA (2025) data, organized via descriptive statistics and represented geospatially with QGIS, covering 12 municipalities directly impacted by the UHE. Results indicate a significant population decline, notably in Babaçulândia, which saw a 24.4% reduction between 2010 and 2022, alongside marked demographic aging. The article shows that the UHE's impacts extend beyond economics, producing negative affects that reduce the power to act and exist among affected individuals and collectivities.

Keywords: *Affects. Hydroelectric Plant. Population Growth. Babaçulândia.*

Afectos negativos de la Central Hidroélectrica de Estreito – Maranhão UHE-MA) en el crecimiento poblacional de los municipios afectados

Resumen
La Central Hidroeléctrica de Estreito – Maranhão (UHE-MA) es un proyecto energético ubicado en el río Tocantins, en operación desde 2011, perteneciente al Consorcio Estreito Energia (CESTE), que impacta directamente a 12 municipios entre los estados de Tocantins y Maranhão, con repercusiones sociales, ambientales y demográficas. En este texto, nos proponemos analizar los impactos negativos de la Central Hidroeléctrica de Estreito en el crecimiento poblacional, destacando la disminución y el envejecimiento de la población relacionados con los procesos de expropiación y desplazamiento forzado. La construcción y operación de la UHE-MA han alterado la dinámica demográfica y las condiciones de vida de las comunidades afectadas, motivo por el cual incorporamos un análisis cualitativo y cuantitativo de los datos entre 2010 y 2025. El estudio se fundamenta en la Teoría de los Afectos, especialmente en las contribuciones de Espinosa (2024) y Deleuze (2002), para interpretar los efectos emocionales y existenciales de la expropiación; en la Teoría de la Transición Demográfica, que sustenta la comprensión de las modificaciones en la estructura etaria; y en la Teoría de la Población de Marx, que relaciona estos cambios con las contradicciones del modo de producción capitalista. Metodológicamente, la investigación utiliza datos oficiales del IBGE (2025) y SIDRA (2025), organizados mediante estadística descriptiva y representados geoespacialmente a través del software QGIS, considerando 12 municipios directamente afectados por la UHE. Los resultados indican un descenso poblacional significativo, con especial énfasis en Babaçulândia, que presentó una reducción del 24,4 % entre 2010 y 2022, además de un notable envejecimiento demográfico. El artículo evidencia que los impactos de la UHE van más allá de las dimensiones económicas,

generando afectos negativos que disminuyen la potencia de actuar y existir de los individuos y colectividades afectadas.

***Palabras clave**: Afectos. Central hidroeléctrica. Crecimiento poblacional. Babaçulândia.*

1 Introduction

This article adopts the concept of "negative affects" based on Deleuze (2002) and Spinoza (2009). For Spinoza, affect is not equivalent to a merely subjective feeling; rather, it refers primarily to the capacity to affect and to be affected. In this sense, Spinoza defines affect as "the affections of the body by which the body's power of acting is increased or diminished, aided or restrained, and at the same time the ideas of these affections" (Spinoza, 2009, p. 58).

In *Ethics*, Spinoza distinguishes two fundamental types of affects. The first comprises active affects, also understood as joyful passions, which increase a person's power to act and exist. These affects allow subjects to move from servitude toward freedom, no longer living merely at the mercy of encounters, but becoming capable of producing encounters that enhance their own power.

The second type comprises passive affects, or sad passions, which diminish the subject's power to act and exist, making life dependent on contingent and often unfavorable encounters. Encounters of this kind may generate processes of disorganization, stagnation, and weakening of individual and collective capacities developed by Prigogine (2002, 2009).

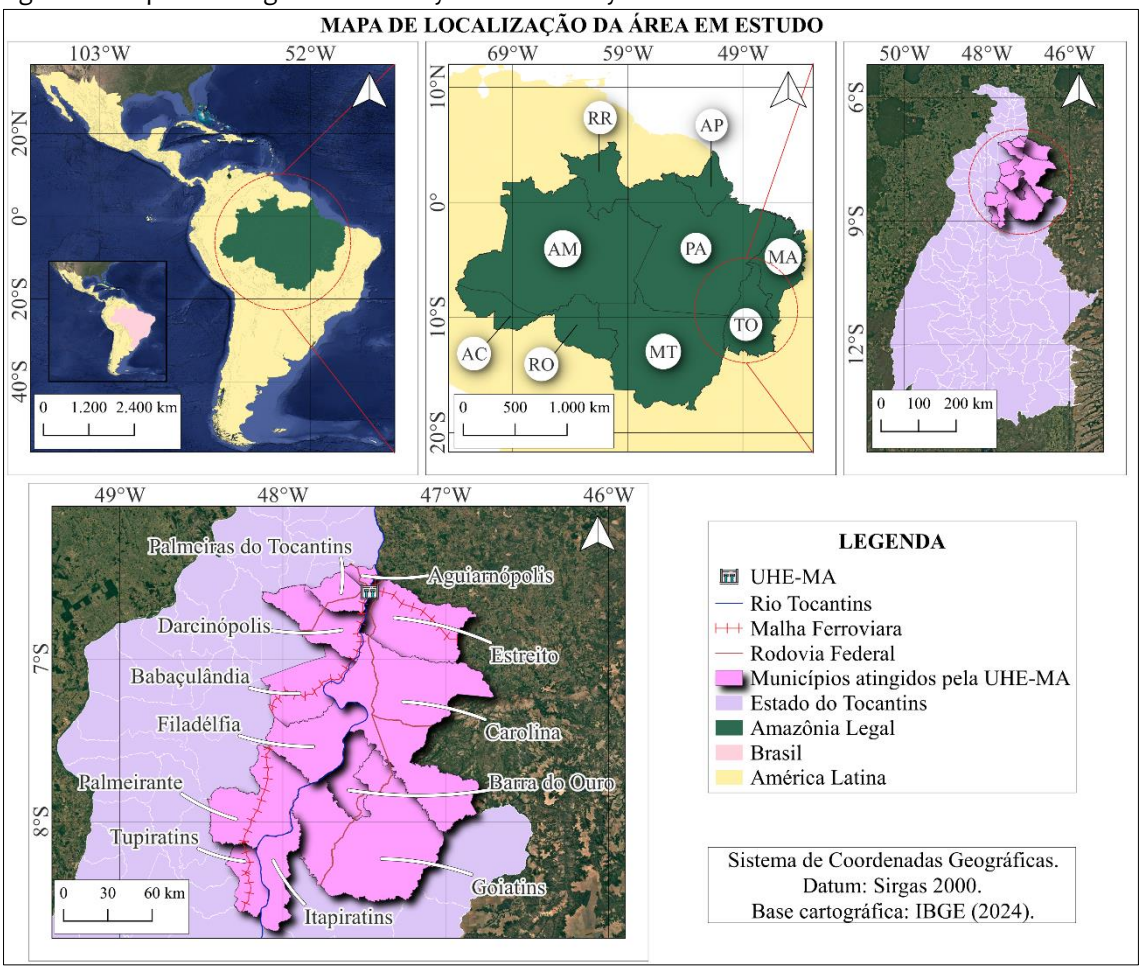
This study analyzes the negative impacts of the Estreito Hydroelectric Plant on population growth in affected municipalities, emphasizing population decline and aging associated with expropriation, forced displacement, and the disruption of traditional ways of life. We argue that many of the experiences lived by populations affected by the plant can be understood as negative affects, especially regarding demographic dynamics. Seven of the twelve municipalities analyzed experienced population decline between 2010 and 2022. Although some of them showed slight recovery in the 2025 estimates, several remained below their 2010 population levels.

The Estreito Hydroelectric Plant is located on the Tocantins River and has been operating since 2011. The project is owned by the Estreito Energia Consortium and operated by ENGIE. Its construction and operation significantly affected the ways of life of populations in twelve municipalities: ten in the state of Tocantins — Aguiarnópolis, Babaçulândia, Barra do Ouro, Darcinópolis, Filadélfia, Goiatins, Itapiratins, Palmeirante, Palmeiras do Tocantins, and Tupiratins — and two in the state of Maranhão — Carolina and Estreito.

The article is organized as follows. First, we present the theoretical background, focusing on the Theory of Affects, Demographic Transition Theory, and Marx's Theory of Population. Next, we describe the methodological procedures, including data sources, descriptive statistical analysis, and geospatial representation. The results section then discusses population growth, decline, and aging in the municipalities affected by the Estreito Hydroelectric Plant. Finally, we present the final considerations, highlighting the demographic and affective implications of forced displacement and territorial transformation.

Figure 1 presents the spatial scope of the research, showing the region affected by the Estreito Hydroelectric Plant.

Figure 1 – Map of the region affected by the Estreito Hydroeletric Plant



Source: Prepared by the authors (2026).

2 Theoretical Background

Theory Spinoza contests transcendence and builds his philosophy on immanence. He proposes a new way to conceive God and, based on this central idea, brings forth a new concept of nature. For Spinoza, human beings are the product of the encounters they experience. Hence, it is essential to seek self-knowledge, understanding one's power to affect and be affected. On this, Deleuze (2002) clarifies:

> One will be called good (or free, or reasonable, or strong) who strives, as far as he can, to organize encounters, to unite with suits his nature, to compose his relation with combinable relations and, by this means, to increase his power (...); one will be called bad, or slave, or weak, or foolish, who lives at the mercy of encounters, content to suffer the consequences,

> ready to moan and to accuse every time the effect suffered shows itself contrary and reveals to him his own impotence. (Deleuze, 2002, p. 29)

Spinoza is known as the philosopher of joy, and this is also why Deleuze considers him the prince of philosophers. Contemporary with Descartes, Spinoza assesses that mind and body act together, establishing a theory of affections (Deleuze, 2002). Before Spinoza and even to this day, affects have not always been valued. As a defender of immanence, Spinoza rejected the idea that emotion should be dominated by reason, which had discredited affects. For him, knowledge does not oppose affects; Spinoza (2024) states that "an affect is an idea by which the mind affirms the force of existing" (p. 166).

According to Iafelice (2015), Spinoza shows that sad affects are effectively used as instruments of control and power, dissimulating and deceiving people to the point that they think and fight for their own enslavement as if it were their salvation. Therefore, resilience must be activated so that our encounters with signs increase joyful affects, positively influencing our power to act and exist.

As we argue, populations directly impacted by the UHE-MA were negatively affected in the sense proposed by Deleuze and Spinoza, since many lost their homes and even means of subsistence—as in the case of Ilha de São José, submerged in the municipality of Babaçulândia and home to 74 families. This affection is also documented in Silva and Sieben (2019) on the boatmen's way of life in Babaçulândia. These changes cut across the lives of many families who live(d) in the region.

Applying the Spinozan framework to the UHE-MA allows us to go beyond a purely quantitative analysis of impacts and reveal a deeply violent ontological and political dimension: the systematic diminishment of the affected populations' power to act. According to Spinoza, the power to act is a being's very essence, expressing its capacity to persevere in existence, to affect and be affected to expand its possibilities. In this context, the UHE-MA's impacts cannot be reduced to resettlement figures or compensations; they must be read as a series of unsuitable encounters producing sad affects and, consequently, a drastic reduction in the collective power of these communities.

The first and most visceral dimension lies in the destruction of home as an existential territory. The submersion of Ilha de São José—home to 74 families—represents far more than geographic relocation. The home, in Spinozan terms, is the environment constituted by a singular network of affections and affects. It is where the individual and collective body established a set of stable, predictable relations that sustain existence. Landscape, rivers, paths, and spaces of sociability are not mere backdrops, but fundamental components of an affective ecology enabling joy—an affect that increases power. The violent destruction of this network constitutes a profoundly sad encounter, a deracinement that generates insecurity, disorientation, and a deep identity crisis, separating communities from the material and symbolic bases of their power to exist.

Almeida (2004) offers a conceptual framework to understand the relation between territory and identity among affected populations. This is decisive to grasp what was lost with the submersion of Ilha de São José and the displacement of its 74 families. It was not only houses and plots; it was an existential territory, built over generations through practices of fishing, floodplain agriculture, navigation, and

sociability. The island was not a "piece of land"; it was the material and symbolic support of a community, whose dissolution produced one of the deepest "sad affects" documented here: the loss of the very capacity to recognize itself as a collective subject. Almeida shows that the struggle for territory is not merely a struggle for land; it is a struggle for the reproduction of ways of life and the affirmation of identities that the State and capital insist on rendering invisible.

Secondly, we observe the conversion of powers into impotence through the destruction of livelihoods. As highlighted in studies on the boatmen of Babaçulândia (Silva and Sieben, 2019), the relationship with the river was not purely instrumental. Fishing, floodplain agriculture, and the very profession of boatman constituted a way of life—actions through which individuals and the collective actively expressed their power in the world, securing not only material subsistence but also social position, know-how, and autonomy. By suppressing these practices, the project not only generated unemployment but actively stripped power. What was once an activity generating joy and autonomy (an increase in the power to act) becomes dependence, uncertainty, and forced idleness—paradigmatic sad affects that diminish the capacity for action.

The process of rights dispossession, pointed out by Silva, Sieben, and Silva (2014), consolidates this diminution on the politico-legal plane. The non-recognition of rights is a higher-order sad affection. It sends a clear message that their suffering and existence are irrelevant to the instituted order. This experience of invisibility and exclusion from the social pact breeds impotent indignation and resentment which, as Spinoza notes, are especially harmful to collective life. They hinder the emergence of a strong multitude capable of acting in its own defense and reinforce servitude, as individuals come to see themselves as unable to change their condition. The theory of forced displacement and resettlement discussed by Cernea (1999) and Scudder (2005) helps clarify this by identifying risks such as loss of access to common resources, community disruption, and economic marginalization—sociological categories that translate the "diminution of the power to act" experienced by families displaced by the UHE-MA.

This chain of sad affects and reduced power to act becomes starkly quantifiable in the drastic population decline experienced by Babaçulândia after the UHE-MA's implementation. Forced rural exodus due to the inundation of productive lands and the destruction of livelihoods is not a mere demographic datum but the statistical expression of the unraveling of the social fabric. Each family leaving the municipality represents the rupture of countless ties of sociability, cooperation, and affection—the final exodus of those who, having exhausted the possibilities of existence in their original territory, are compelled to seek mere subsistence elsewhere. This depopulation is thus the concrete, tragic proof of the project's success in undermining the bases that sustained life in the region, crowning the process of rights dispossession, territorial loss, and community disintegration with the gradual erasure of the very human presence that gave the place its meaning.

The construction of the UHE-MA operated as a producer of sadness on multiple fronts—existential, economic, and political. It did not merely relocate people but actively deformed the conatus—the effort of the affected communities to persevere in their being—replacing encounters that increased their power (autonomous work, community life in the territory, recognition) with encounters that

diminished it (deterritorialization, dependence, invisibility). Analyzing this case through Spinoza's lens reveals that the true cost of such projects is not measured only in flooded hectares or resettled families, but in the ethical degradation imposed on entire human groups whose capacity to affect and be affected by the world in a full and joyful manner has been severely compromised.

This overall diminishment is expressed in the population decline between 2010 and 2022 across affected municipalities—58.3% of cases analyzed. Among them, Babaçulândia shows the steepest drop, losing 24.4% of its population in the period. In this sense, Demographic Transition Theory (DTT) and Marx's Theory of Population (TP) are mobilized as complements to the Theory of Affects to aid understanding.

Proposed by Warren Thompson in 1929, DTT explains the stages through which societies pass, from pre-transition to population stabilization. It highlights that natural increase (births minus deaths) and migration are key to understanding population dynamics—especially in Brazil's present stage, marked by low birth and death rates, leading to population aging (Silva et al., 2025).

Alongside, Marx's Theory of Population relates population dynamics to economic and social conditions and class relations in the capitalist mode of production. Marx criticizes Malthus's law and argues that population variations reflect class interests and social inequalities that shape fertility, mortality, and migration (Gennari, 2023).

Combining the three theories—the Theory of Affects, Demographic Transition Theory, and Marx's Theory of Population—allows us to interpret demographic differences among municipalities, identifying historical, social, economic, political, and environmental drivers, as well as labor relations and their contradictions. These approaches portray a region in the Legal Amazon with high levels of deprivation of freedoms (UNICEF, 2018, 2022).

Together, these perspectives give historical and political depth to the Spinozan concept of "sad affect." They show that diminished power to act is not abstract or merely subjective; it is produced by concrete dispositive of power—expropriation, precarious resettlement, destruction of livelihoods, denial of rights. At the same time, they point to the power of resistance that persists even under adverse conditions, whether through everyday negotiations, collective mobilization, or symbolic reterritorialization.

3 Methodology

We use quantitative data and descriptive statistics. According to Marconi and Lakatos (2021), quantitative research quantifies data, organizing them with tables, charts, and numerical measures. Gil (2025) states that descriptive research aims to describe characteristics of phenomena or populations and establish relations among variables, using standardized data-collection techniques.

For map production and data visualization, we used QGIS 3.44.3 (QGIS, 2025), whose geoprocessing capabilities enable geospatial analysis of population growth and aging in municipalities affected by the UHE-MA.

The Demographic Census is a nationwide statistical operation in Brazil to collect information on population, economy, and territory. Population figures for 2010, 2022, and 2025 were obtained from the same source—the Brazilian Institute of Geography and Statistics (IBGE), via the SIDRA portal (2025). The subsequent section presents municipal population growth and aging indices for 2010–2022 and 2022–2025.

To calculate population growth variation, we used the Datasus (2025a) formula for the average annual population growth rate, influenced by fertility, mortality, and migration. This rate—computed from the relation between populations at two points in time—supports estimates, projections, and public policy planning (PP), though it requires caution due to temporal and spatial variation in Brazilian demographics, especially for fine geographic breakdowns and long-range projections. The second equation, from Datasus (2025b), computes the aging index as the number of people aged 60+ per 100 under 15. The index tracks demographic transition and informs PP in health and pensions, despite data limitations, hence our interdisciplinary use of both formulas.

The Theory of Affects (Spinoza, 2024), Demographic Transition Theory (Thompson, 1929; synthesized by Silva et al., 2025), and Marx's Theory of Population (Gennari, 2023) frame our discussion.

We hold that the Theory of Affects applies to this case via sad modes we observed—especially in Babaçulândia—where the dam's construction was not merely a physical intervention but a sad affective event, marked by a collective diminishment of the power to act, exemplified by the loss of home (Ilha de São José). Home is not merely shelter; it is an existential territory, a network of memories, affects, and meanings that compose identity. Its submersion is a sad affection—deterritorialization that diminished the capacity to exist of those 74 families, who also lost livelihoods, such as the boatmen cited in Silva and Sieben (2019). Fishing, agriculture, and navigation are actions through which these people express their power to exist and to relate to the world. The stripping of these practices directly converts power into impotence.

Rights dispossession is the juridical-affective dimension. Having one's rights unrecognized is a sad affection that engenders invisibility and non-belonging to the political community. The message is clear: "your existence and your suffering do not matter." This corrodes self-esteem and the capacity for collective struggle.

Given the greater vulnerability found in secondary data, Babaçulândia is our focal case among the 12 selected municipalities. It can be understood through Demographic Transition Theory, which describes changes in birth and death rates over time and their effects on age structure and population growth—providing a relevant frame for the region's demographic dynamics.

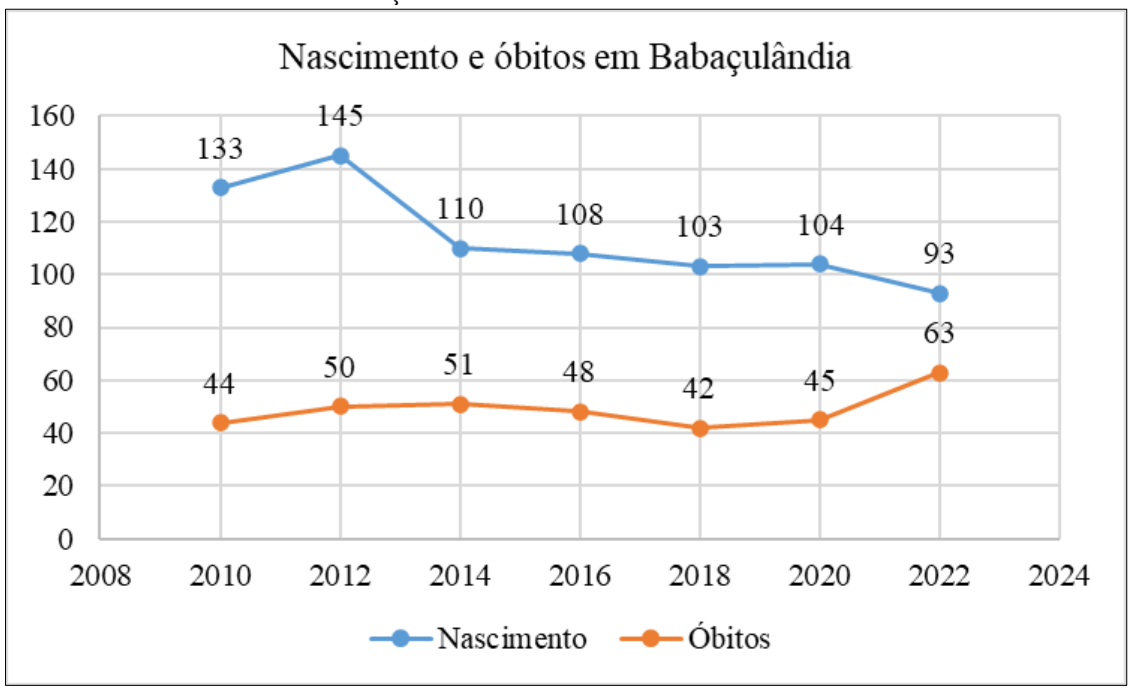
Babaçulândia is transitioning to the fourth stage of demographic transition:

> In the fourth stage, demographic stabilization arises from low birth and death rates, resulting in near-zero or negative natural increase. This stage is associated with population aging. (Silva *et al.*, 2025, p. 304-305).

As births decline while deaths remain stable—though in 2022 deaths increased, approaching births become evident the municipality is likely transitioning

from the third to the fourth stage, or has already entered it. The fourth stage features population stabilization or reduction, accompanied by age-structure aging. This interpretation aligns with the DTT stage IV model in Chart 1, which underpins this analysis.

Chart 1 – Births and deaths in Babaçulândia Source



Source: Prepared by the authors on SIDRA data (2025).

Considering Marx's Theory of Population, forced migration caused by the UHE-MA and the expropriation of families reduced the resident youth population, accelerating relative aging (typical of stage IV of demographic transition). Families moved to other areas, such as Araguaína and nearby resettlements, in search of better living conditions (Carvalho; Sieben, 2019), contributing to the demographic decline recorded between 2010 and 2022. This reflects not only the socioeconomic impacts of the project but also the demographic transition process altering population dynamics—leading to negative growth that reinforced low fertility and population aging in the region.

Thus, Babaçulândia exemplifies how external factors such as forced migration can accelerate trends predicted by Thompson and Marx, reshaping local age composition and population growth. This is an initial analysis linking observed data to theoretical constructs, to be deepened subsequently.

4 Results

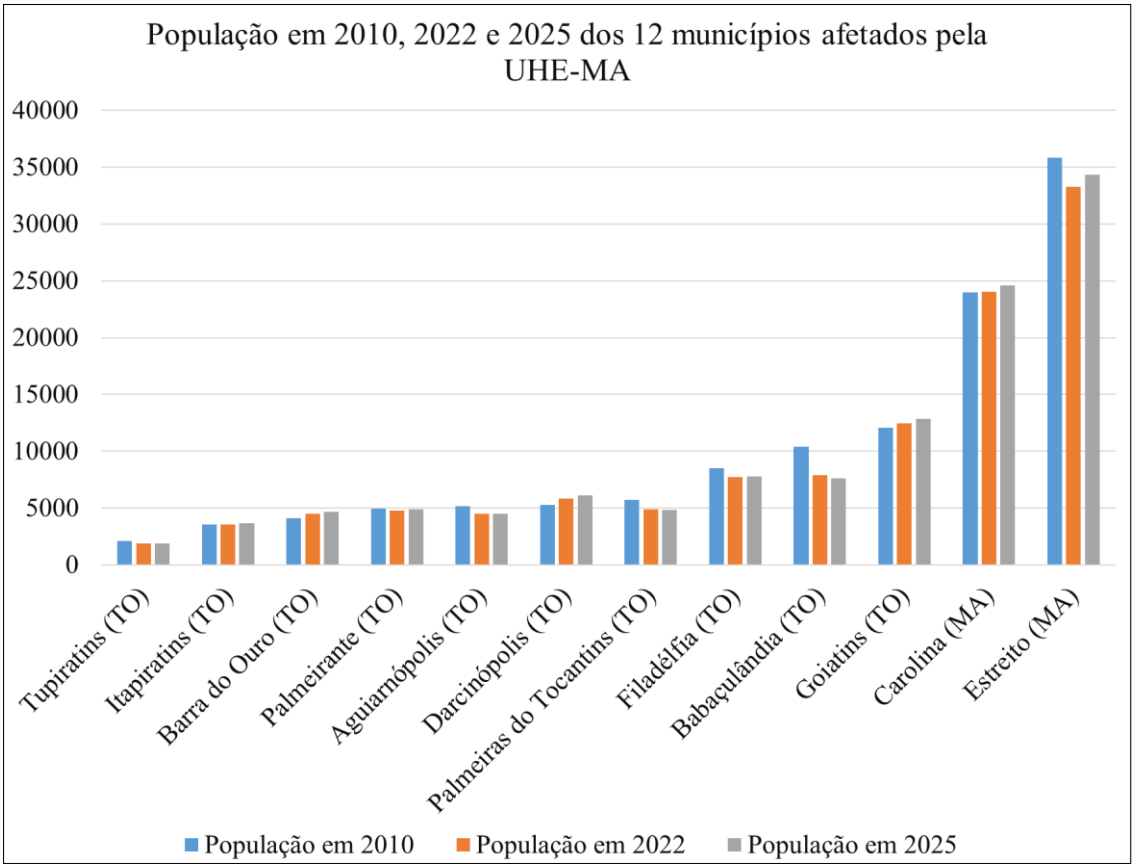
We used the IBGE's SIDRA system (2025) to collect data and subsequently computed population growth rates for the twelve municipalities impacted by the UHE-MA across the last three census years: 2010, 2022, and 2025. Table 1 and Chart 2 present the processed population results for analysis. Table 1 and Chart 2 present the processes population results for analysis.

Table 1 – Population results in 2010, 2022 e 2025

Município	População em 2010	População em 2022	População estimada em 2025
Aguiarnópolis (TO)	5162	4497	4502
Babaçulândia (TO)	10424	7880	7636
Barra do Ouro (TO)	4123	4476	4667
Carolina (MA)	23959	24062	24619
Darcinópolis (TO)	5273	5827	6093
Estreito (MA)	35835	33294	34321
Filadélfia (TO)	8505	7712	7784
Goiatins (TO)	12064	12433	12851
Itapiratins (TO)	3532	3577	3685
Palmeirante (TO)	4954	4798	4905
Palmeiras do Tocantins (TO)	5740	4872	4850
Tupiratins (TO)	2097	1874	1886

Source: prepared by the authors on SIDRA data (2025).

Chart 2 - Population in 2010, 2022 and 2025 for municipalities affected by the UHE-MA



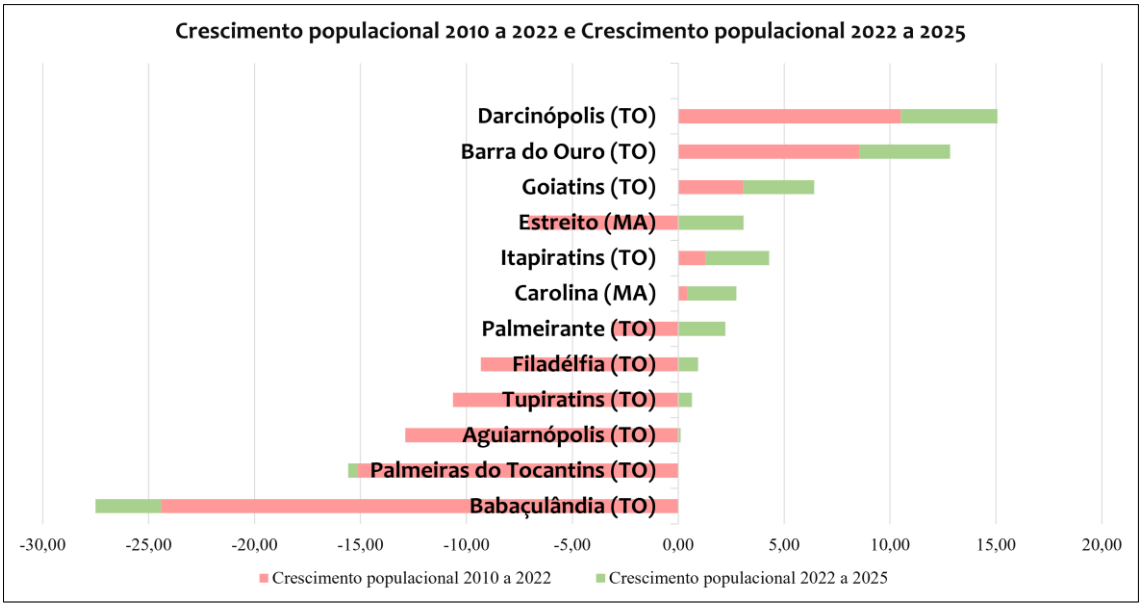
Source: prepared by the authors on SIDRA data (2025).

The research was conducted between October and November 2025. Data for 2025 in Table 1, while the most up-to-date and reliable available, are projections based on previously collected data, using statistical models to forecast future trends. These estimates refer to July 1, 2025 (IBGE, 2025). For visual comprehension, Chart 2 displays the results as columns.

A purely quantitative reading highlights the largest municipalities between 2010 and 2025: Carolina (MA), with about 24,000 inhabitants in 2010 and projected 24,619 in 2025; and Estreito (MA), which went from ~35,800 in 2010 to 33,294 in 2022 and is expected to reach ~34,321 in 2025—indicating decline by 2022 with a slight recovery by 2025, though still below 2010 levels. Smaller municipalities include Tupiratins (TO), which declined from 2,097 (2010) to 1,874 (2022), and Babaçulândia (TO), from 10,424 (2010) to 7,880 (2022), indicating population reduction.

Next, Chart 3 shows population growth for municipalities impacted by the UHE-MA between 2010 and 2022, with projections for 2022–2025, highlighting growth, stagnation, or decline.

Chart 3 – Population growth of municipalities impacted by the UHE-MA between 2010 e 2022, and projections for 2022 to 2025



Source: prepared by the author on SIDRA data (2025).

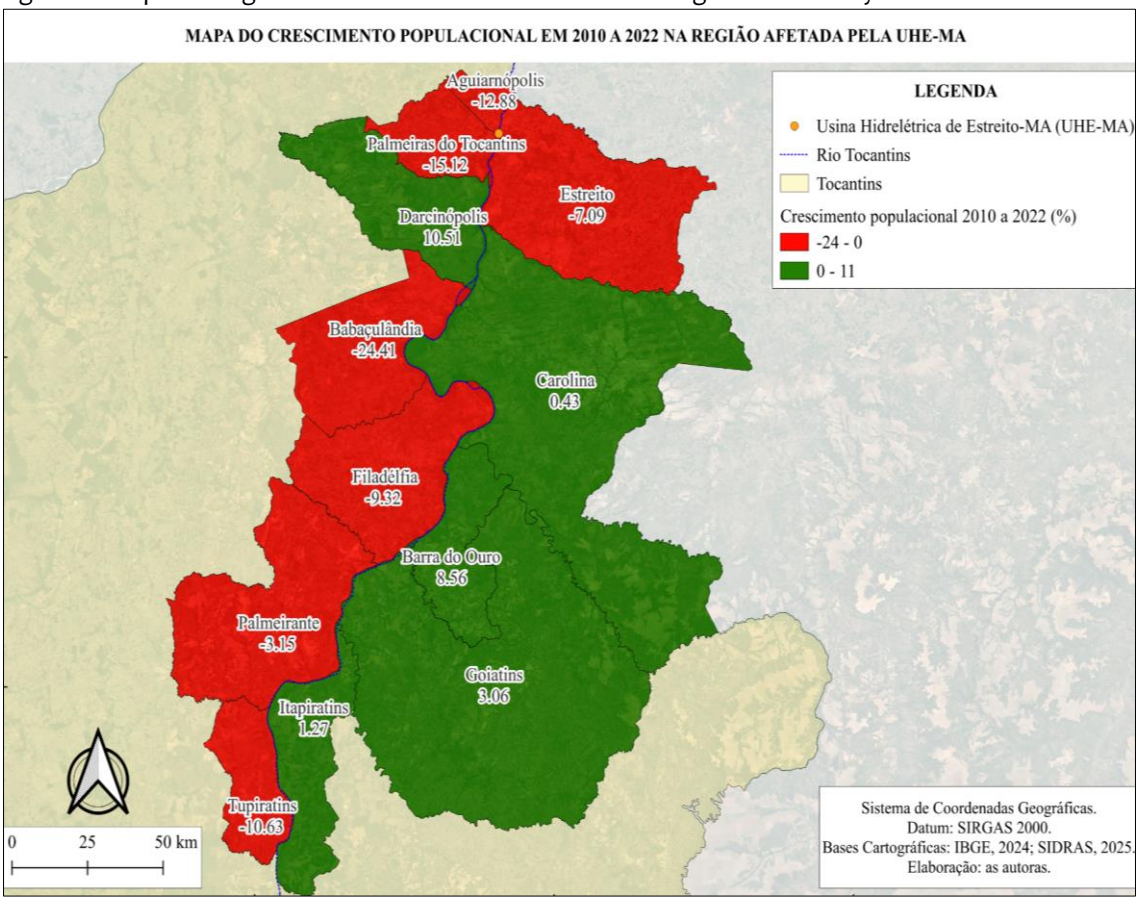
The information in Chart 3 - also mapped in Figures 2 and 3- reveals varied demographic dynamics in the region, with both declining and recently growing localities.

Babaçulândia (TO) shows the largest contraction: –24.41% from 2010 to 2022 (Figure 2), with a further projected –3.10% to 2025 (Figure 3), from 7,880 to 7,636 inhabitants.

In contrast, Barra do Ouro (TO) and Darcinópolis (TO) display recent growth. Barra do Ouro increased by 8.56% (2010–2022; Figure 2) and is projected to grow 4.27% to 2025 (Figure 3), suggesting recovery or attraction. Darcinópolis grew 10.51% (Figure 2) and is expected to continue growing (4.56%) (Figure 3).

Carolina (MA) exhibits stability or very moderate growth, with +0.43% (2010–2022; Figure 2) and a projected +2.31% to 2025 (Figure 3), suggesting demographic stability. Municipalities such as Aguiarnópolis, Palmeiras do Tocantins, and Tupiratins continue to face population decline—albeit at lower rates—suggesting challenges like Babaçulândia's, such as migration or declining fertility.

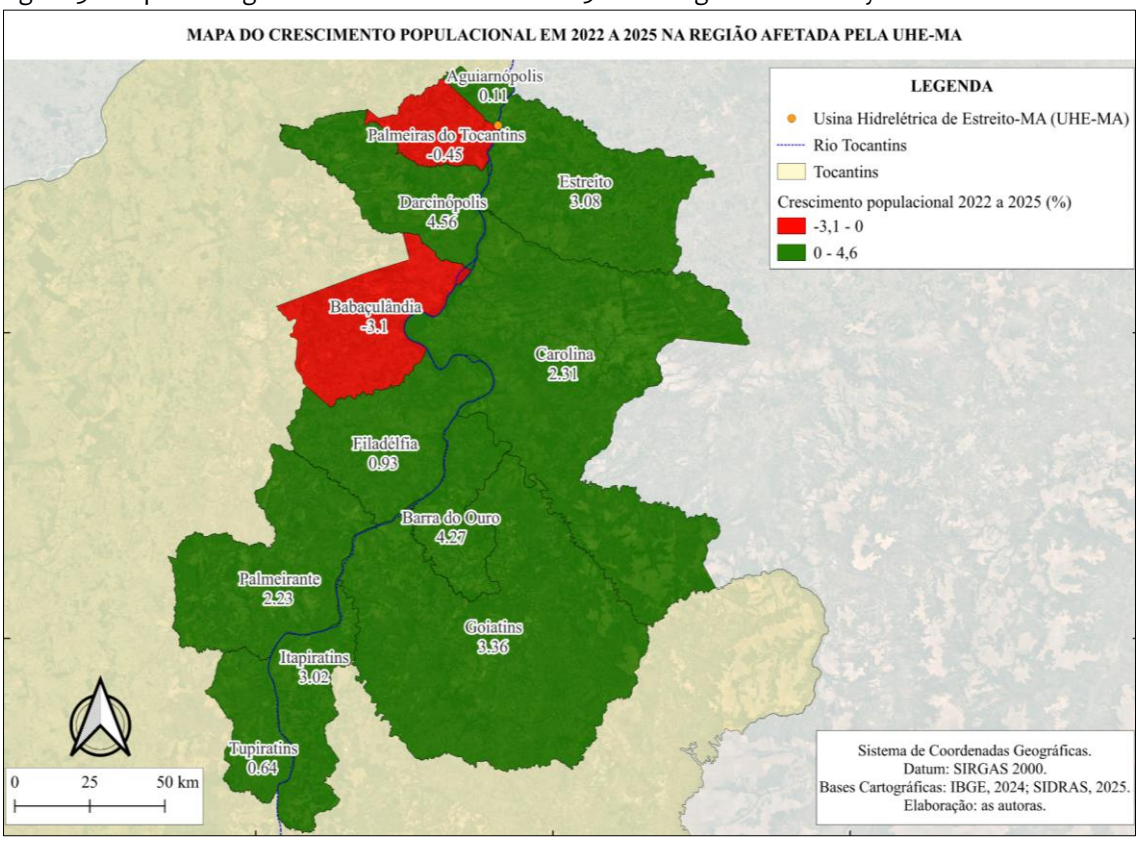
Figure 2 – Population growth between 2010 and 2022 in the region affected by the UHE-MA



Source: prepared by the authors on SIDRA data (2025).

In the text, population values for 2010–2022 appear in Figure 2, while projections for 2022–2025 appear in Figure 3. These maps use a color code: regions with negative population growth are in red (decline), and municipalities with growth are in green (expansion). This visual representation quickly identifies areas with declining or increasing population during the analyzed and projected periods, facilitating understanding of regional population dynamics.

Figure 3 – Population growth between 2022 and 2025 in the region affected by the UHE-MA



Source: prepared by the authors based on SIDRA data (2025).

These transformations illustrate how local demographic phenomena can be influenced by economic and territorial interventions that alter age structure and population dynamics.

Between 2010 and 2022, Araguaína—the regional center—grew 13.80%, above the national average (6.45%) and Tocantins state average (9.25%) over the same period (SIDRA, 2025; REGIC, 2018). Using Araguaína's Immediate Region of Influence (RIIA) (Lima, 2025), affected municipalities such as Babaçulândia can be analyzed through their ties and dependence on flows to this regional pole. In this context, we highlight forced migration and depopulation, evidenced by Babaçulândia's steep decline (Figure 2) and the displacement of populations to Araguaína—the hub for essential services and opportunities in health, education, employment, commerce, and everyday needs.

This indicates that part of the UHE-MA's indirect impacts fall on Araguaína, a medium-sized municipality influencing 20 smaller surrounding municipalities and absorbing significant flows of people, economic activity, and services from affected areas.

This process also affects riverside culture, since expanded flooded areas immediately affect territories and ways of life. According to MapBiomas (2024), flooded areas rose from 1% (1985) to 2% (2024). Socioeconomically, expanding flooded areas can entail loss of productive lands, undermining fishing, farming, and extractivist activities that support both local economies and traditional ways of life. This tends to intensify population displacements, reconfigure land use/occupation, and deepen social vulnerability—especially among groups directly dependent on

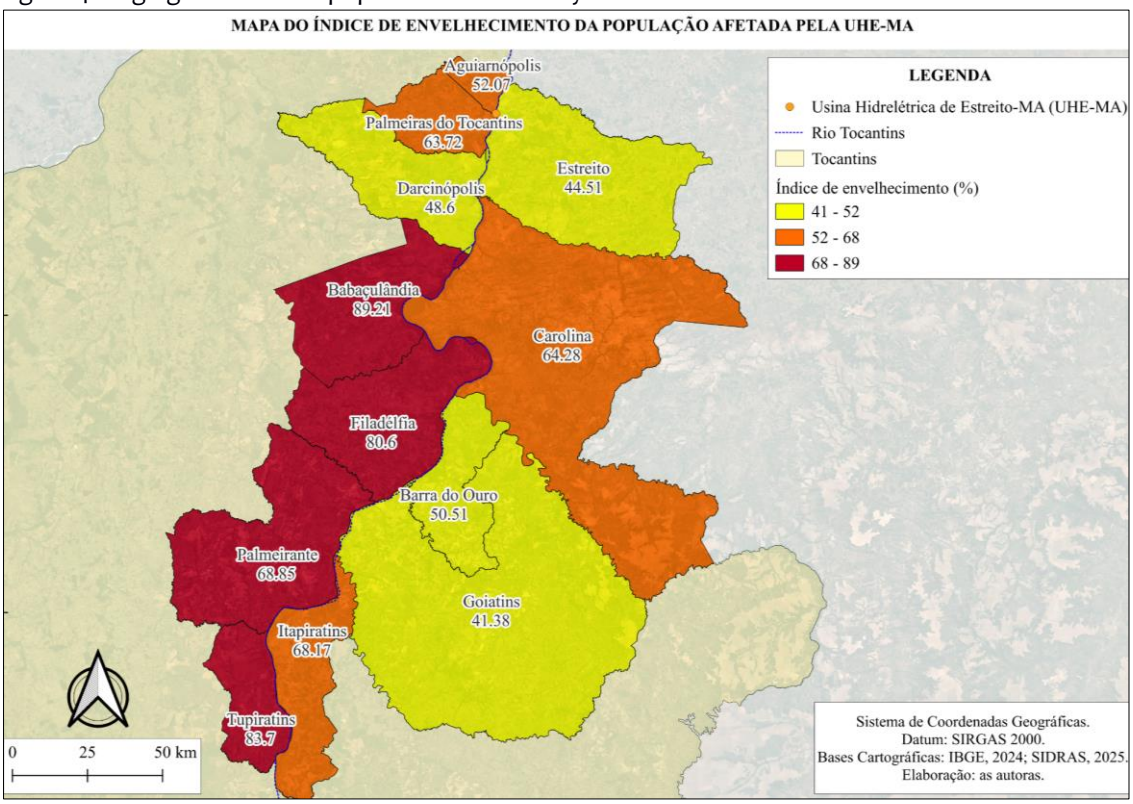
territory for subsistence—widely discussed by Castro (1998) and Silva and Sieben (2019). This dynamic persists in 2022–2025 for Babaçulândia (–3.1%) and Palmeiras do Tocantins (–0.43%) as observed in Figure 3.

The construction of the UHE-MA and formation of its reservoir within Babaçulândia—the most affected municipality—began in December 2010 and concluded in May 2011. This created a new territorial reality and altered community dynamics: expulsion and forced resettlement; loss of traditional livelihoods; transformation of socio-economic structures; disruption of community ties and affective bonds to territory; environmental degradation; psychological and cultural impacts; demographic changes; and growing economic dependence on multinational corporations and the State (Sousa; Borges; Pacifico Filho, 2024; Carvalho; Sieben, 2019; Lima, 2025). According to a CESTE report (2011), 2010 marked a decisive moment for the plant, one of the largest works underway in Brazil's electric power sector, located on the border between Maranhão and Tocantins.

However, this transformation entailed negative impacts on the local population. Sousa, Borges, and Pacifico Filho (2024) note that compensation began in 2007, followed in 2009 by relocation into new dwellings. Thus, Babaçulândia's negative population growth can be attributed to forced migration caused by UHE-MA construction and the expropriation of resident families in the municipality and neighboring settlements. The dam's installation forced people to move to other regions, such as Araguaína, and to specific resettlements, including Santos Estêvão, Mirindiba, Bela Vista, and Baixão. After relocation, former homes were demolished and plots backfilled, cementing the transformed landscape.

Considering Demographic Transition Theory, forced migration and expropriation directly affect the composition and distribution of the population, accelerating the reduction of resident youth and aggravating relative aging. This is shown in Figure 4, where Babaçulândia stands out as the most affected among the twelve analyzed by the UHE, with approximately 89%. These phenomena align with the third stage of demographic transition, characterized by fertility decline and age-structure changes that influence both population growth and local socio-economic composition.

Figure 4 – Aging index of the population affected by the UHE-MA in 2022



Source: prepared by the authors on SIDRA data (2025).

From Marx's perspective on population, dynamics are intrinsically tied to contradictions of capital accumulation. The UHE-MA was financed and built by the Estreito Energia Consortium (CESTE), composed of GDF Suez (energy), Vale (mining), Alcoa (aluminum), and Camargo Corrêa Energia (engineering/construction/energy), which won the 2002 bid and holds a 35-year concession.

Plant construction triggers population displacement, environmental impacts, and changes in traditional livelihoods. From a Marxian standpoint, these tensions illustrate the conflict between the logic of capitalist accumulation and the social conditions of affected populations.

Sieben and Junior (2016) highlight that the UHE Estreito primarily serves the interests of a small economic group—owners of Brazil's power-intensive industries. Sectors such as cement, ceramics, ferroalloys, mining, pelletizing, paper, textiles, pulp, steel, food, and metal products consume about 40% of the country's electricity. The energy produced thus secures higher profits for major investors, who initially appropriated the State and now seek to control natural resources and territories in line with their economic interests. Conversely, local communities are harmed and deterritorialized, often without proper resettlement or adequate compensation—sadly affecting these subjects and diminishing their power to act and exist.

5 Final Considerations

The depth of the issue in Babaçulândia is not merely territorial or economic. It is an ethical-affective conflict. On one side, a power that operates by managing sad

affects to produce servitude and a notion of progress that empties life. On the other, a community that, in its struggle for resilience, seeks to activate joyful encounters to recompose its power to act and exist, asserting its right not merely to survive but to live powerfully. Spinoza's theory, filtered by Deleuze and the authors cited—offers lenses to see this invisible yet fundamental struggle that defines what it means to be alive and free.

This research shows that the UHE-MA's impacts transcend the socio-economic and environmental spheres, reaching the very ontological and demographic structure of affected communities. The integrated analysis of the Theory of Affects (Spinoza/Deleuze), Demographic Transition Theory, and Marx's Theory of Population was essential to grasp the depth and interconnection of these impacts. The quantitative data are unequivocal: the drastic 24.4% population decline in Babaçulândia and aging verified in 58.3% of the municipalities are the statistical expression of a social catastrophe. Demographic Transition Theory frames this as an abrupt distortion of the population regime driven by forced exodus. Marx and Spinoza reveal the deeper causes of this distortion.

Marx's Theory of Population exposes the capitalist logic underlying the project, which treats population as an adjustable variable in favor of accumulating energy and capital. Forced displacement, rights dispossession, and livelihood destruction—as seen with the boatmen and residents of Ilha de São José—materialize the "contradictions of the mode of production" that generate an "industrial reserve army" and empty territories misaligned with its productivity logic. The UHE Estreito symbolizes, in microcosm, the conflict intrinsic to Marx's population theory: social reproduction under capitalism is neither neutral nor oriented to collective well-being but responds to capital's specific needs.

The Theory of Affects, in turn, confers the human and existential dimension to this structural analysis. The project acted as a machine producing "unsuitable encounters," generating a chain of sad affects—deracination, impotent indignation, helplessness—that systematically diminished the communities' power to act. Loss of home, livelihoods, and social recognition were not only material losses but ruptures in the affective ecology sustaining these populations' capacity to persevere in existence fully and joyfully.

We conclude that population decline and aging are not mere collateral effects but the demographic materialization of a collective diminishment of the power to act and exist. The departure of youth and families represents the final unraveling of the social fabric—the point at which sadness and impotence convert into exodus. Our theoretical articulation shows that anomalous population dynamics, exclusionary economic logic, and affective degradation are inseparable faces of the same deterritorialization process.

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