Revista ARACÊ
ISSN: 2358-2472

SOCIO-ENVIRONMENTAL VULNERABILITY AND PUBLIC SAFETY IN DUMP AREAS OF THE MUNICIPALITIES OF THE LAKE OF THE TUCURUÍ HYDROELECTRIC POWER PLANT/PA

https://doi.org/10.56238/arev7n1-186

Submitted on: 22/12/2024 **Publication date:** 22/01/2025

Rosinara Santos de Abreu[1], Wando Dias Miranda[2], Lucy Anne Cardoso Lobão Gutierrez[3], Sonia da Costa Passos[4] and Iêdo Souza Santos[5]

ABSTRACT

Objective: This work aims to discuss the concepts of social vulnerability and public security of the municipalities that make up the region of Lake Tucuruí and the Environmental Protection Area of Lake Tucuruí, established in 2002 by Law No. 6451/02, being Breu Branco, Goianésia, Jacundá, Novo Repartimento and Tucuruí, located in the state of Pará. Methodology: The research has a descriptive and exploratory nature, addressing the analysis of authors in the field of social vulnerability and public security, having the database of the SISP-2 system, of the Civil Police of Pará – PCPA. The study area is the 05 (five) municipalities that make up the Tucuruí Lake, and factors that influence social vulnerability in the research territory are observed. Results: The study on socio-environmental vulnerability and public safety in landfill areas in the region of the Lake of the Tucuruí Hydroelectric Power Plant highlights the complexity and interconnection between environmental, social and public safety factors. Using the Social Vulnerability Index (SVI) and the Social Progress Index (SPI), the study revealed how poor urban infrastructure, inadequate water supply and lack of garbage collection contribute to increasing the

[1] Strategic Management Specialist
Institute of Public Security of the State of Pará - IESP
Email: sarahabreu4@hotmail.com
ORCID: https://orcid.org/0009-0002-6583-5984
LATTES: http://lattes.cnpq.br/3305732587613313
[2] Dr. in Development
University of the State of Pará
E-mail: wandomiranda@outlook.com
ORCID: https://orcid.org/0000-0003-1630-6736
LATTES: http://lattes.cnpq.br/6925939035060395
[3] Dr. in Geosciences
University of the State of Pará (UEPA)
Email: lucyannegutierrez@uepa.br
ORCID: https://orcid.org/0000-0002-4199-1977
LATTES: http://lattes.cnpq.br/4345569332925330
[4] Post-Doctorate in Geography
Institute of Security Education of Pará - IESP
E-mail: sscpassos_10@yahoo.com.br
ORCID: https://orcid.org/0009000416567025
LATTES: http://lattes.cnpq.br/9331707260231198
[5] Dr. in Production Engineering
University of the State of Pará
E-mail: iedo@uepa.br
ORCID: https://orcid.org/0000-0003-2563-3245
LATTES: http://lattes.cnpq.br/0003944334870038

Revista ARACÊ
ISSN: 2358-2472

vulnerability of local communities, and consequently increasing social risks for the resident population of these areas.

Keywords: Amazon. Management. Waste. Public Security. Vulnerability.

Revista ARACÊ
ISSN: 2358-2472

INTRODUCTION

Humans have always produced waste, and the management of this waste has been a constant concern in societies throughout history (Downs and Medina, 2000). The Industrial Revolution is a historical marker of the increase in waste generation, as a result of the accelerated urbanization process and population growth between 1950 and 1970, contributing to the increased production of urban solid waste (MSW) (Wilson, 2023).

From the 1970s onwards, waste management became a central issue in the politics of Western nations to the north, with legislation emerging to regulate the consumption of natural resources and the management of the resulting waste. Thus, in the Global North, waste management evolved from collection and disposal control to more integrated approaches between 1990 and 2010. In contrast, in the Global South, the foundation for waste management only began to form in the 1990s, and currently, millions of people still lack access to adequate waste collection services, with a large portion of waste being disposed of in the open or burned (Whiteman et al., 2021; Wilson, 2023).

The consequences of poor waste management generate impacts on health, on the environment, contributing to the reduction of greenhouse gas emissions and contributing to marine pollution, generates "indirect costs of inaction", hence the urgency of recognizing the value of waste for the transition from Waste Management (SWM) to Waste and Resource Management (WaRM) (Vellis, 2021; Gomez-Sanabria, 2022; Wilson, 2023).

In Brazil, Law 12.305/10, which instituted the National Solid Waste Policy (PNRS), seeks to address these challenges, but many municipalities still face institutional and economic barriers to complying with its guidelines, especially with regard to the closure of open dumps (BRASIL, 2010; Batista et. al, 2021). In the state of Pará, most municipalities still use open-air dumps as the main method of waste disposal (BRASIL, 2021; Pojo and Norat, 2022), which also occurs in the cities of Tucuruí, Breu Branco, Novo Repartimento, Goianésia do Pará and Jacundá and generates impacts on public safety and increases socio-environmental vulnerability.

The Sustainability Barometer Report, published in 2023 by the Amazon Foundation for Support and Studies and Research of Pará, evaluates Human Well-Being and Ecosystem Well-Being in the municipalities of Pará, considering indicators such as the number of robberies and homicides, deforestation rates, percentage of the population with access to piped water, air quality through the identification of hot spots and percentage of garbage collection, among others. In the general sustainability analysis, the municipalities

Revista ARACÊ
ISSN: 2358-2472

of Tucuruí, Jacundá and Goianésia do Pará are classified in the 'intermediate' range, below the 'potentially sustainable' category and above the 'potentially unsustainable'. In contrast, Breu Branco and Novo Repartimento are classified in the 'potentially unsustainable' range (FAPESPA, 2024).

The municipalities analyzed have part of their territories integrated into the Environmental Protection Area (APA) that makes up the Mosaic of Conservation Units of the Tucuruí Lake, established in 2002 and having among its objectives, to promote environmental sustainability and the preservation of the environment, previously impacted by the installation of the UHE-Tucuruí, which flooded the municipality of Jacundá, in addition to parts of Breu Branco, Novo Repartimento, Goianésia do Pará, Tucuruí and others, as part of this process, the compulsory relocation of residents who had already established their ways of life in these regions, many of whom depended significantly on fishing (Acserald, 1991; Santana et al., 2014). The existence of garbage dumps near watercourses in these municipalities harms fishing, a vital activity for the local economy, in addition to compromising the livelihood and way of life of the inhabitants of the more than 1,000 islands formed after the construction of the dam (Das Mercês et al., 2019; Pereira et al., 2022).

The presence of open-air dumps not only degrades the environment by contaminating soils and water bodies, but also creates an environment conducive to illicit activities due to the lack of surveillance and adequate infrastructure. The marginalization of these areas contributes to social exclusion, disproportionately affecting the most vulnerable communities (De Oliveira, 2022). Thus, the existence of open-air dumps in the Lake region of the Tucuruí HPP highlights the need for public policies that integrate waste management with public safety and sustainable social development strategies.

Given this scenario, the study aims to investigate how dumps affect public safety and intensify socio-environmental vulnerability in the cities of Breu Branco, Goianésia do Pará, Jacundá, Novo Repartimento and Tucuruí. The research seeks to analyze the relationship between the environmental degradation caused by dumps and the increase in crime and social vulnerability in these areas. The question that guides the research is aimed at answering how the dumps in the Lake region of the Tucuruí HPP affect public safety and enhance the socio-environmental vulnerability of local communities? Based on the hypothesis that dumps, in addition to violating international standards and PNRS

Revista ARACÊ
ISSN: 2358-2472

guidelines, contribute to environmental and social degradation, the research aims to provide a detailed analysis of the impacts of these places on public safety.

The research focuses on understanding how degraded areas become direct or indirect foci of illicit activities, exacerbating the vulnerability of communities already facing socioeconomic challenges. The research uses an interdisciplinary approach, integrating data on social vulnerability from IPEA's IVS, IPS Brazil 2024, and IPS Amazônia 2023 indices to map the influence of dumps on crime. By focusing on the Lake region of the Tucuruí HPP, the study offers a specific case that can be compared with other regions, enriching the understanding of solid waste management in similar contexts.

RESEARCH METHODOLOGY AND GEOGRAPHIC SPACE OF REFERENCE

The research on social vulnerability had as *its locus* the municipalities of Breu Branco, Goianésia do Pará, Jacundá, Novo Repartimento and Tucuruí

In the research, qualitative and quantitative methods were adopted with an interdisciplinary approach. The documentary research was based on data from the 2022 IBGE Census, the IPEA Social Vulnerability Atlas for the years 2000 and 2010 and the 2023 Panoramas of IPS Amazônia and 2024 of IPS Brasil, as well as the analysis of police records for the period 2020-2023 contained in the database of the Assistant Secretariat for Intelligence and Criminal Analysis (SIAC). In the SIAC report, there was a lack of data on the distribution of police occurrences by neighborhoods in the municipalities of Breu Branco, Goianésia do Pará, Jacundá and Novo Repartimento for the years 2022 and 2023, which raised a barrier that would compromise the analysis and, therefore, it was necessary to collect this information in the Integrated Public Security System (SISP 2).

The research had as *its locus* the municipalities of Breu Branco, Goianésia do Pará, Jacundá, Novo Repartimento and Tucuruí. The collection and analysis of data on socio-environmental vulnerability followed the stages of organization of components and indicators, tabulation, intermunicipal comparison and temporal analysis. The objective was to understand the dynamics of vulnerability, using data from IPS Brazil 2024 and IPS Amazonia 2023 as tools. The methodological procedure adopted in this analysis involved the preparation of the data, the tabulation of the information. Next, information from the municipalities of Breu Branco, Goianésia do Pará, Jacundá, Novo Repartimento and Tucuruí were selected. The analytical techniques employed combined descriptive, comparative and trend analysis, enabling a dynamic understanding of the indicators. The

Revista ARACÊ
ISSN: 2358-2472

generation of bar graphs and the use of descriptive statistical analysis complemented the interpretation of the data

The methodological procedure adopted in the analysis of crime started from the collection of criminal records covering all neighborhoods of the municipalities, and, in particular, the neighborhoods located close to the dumps, covering the time period from January 2020 to December 2023. The methodology prioritized a multidimensional approach, allowing for comparative and segmented analyses that made it possible to understand the nuances of local crime.

RESULTS AND DISCUSSIONS

SOLID WASTE MANAGEMENT AND ENVIRONMENTAL IMPACTS OF OPEN DUMPS

Adequate waste management, especially in developing countries, occupies a supporting position in the scenario of political agendas and faces barriers such as inadequate infrastructure and limited resources, and the policies adopted to mitigate these impacts are not able to fully meet the needs of society or legal dictates (Batista *et al.*, 2021). In Brazil, Brazilian municipalities have not yet implemented the guidelines established by the PNRS, especially small ones, which deal with the lack of financial resources and the absence of effective partnerships between the different levels of government (Maiello *et al.*, 2018), adding to this picture, the lack of environmental education programs (ABRELPE, 2021).

MSW management requires multidisciplinary skills and the collaboration of all stakeholders such as public authorities, community, and public-private partnerships (PPP) (Chen *et al*., 2010) that can overcome deficiencies in the collection, transportation, and final disposal of waste, whose final destination is still open-air dumps (Nascimento and Filho, 2021). The absence of strategic planning and accurate diagnoses aggravates the situation due to the lack of definition of goals and actions that guarantee sustainability in waste management and, in turn, the scarcity of financial resources limits the ability of municipalities to invest in technologies and training programs, not benefiting from the economic potential of waste reuse and making sustainable management that includes social participation unfeasible (Selau, 2018).

Integrated and sustainable solid waste management (GRIS), which considers the entire MSW management chain and integrates interrelated processes, emerges as a tool to face these challenges (Marshall and Farahbakhsh, 2013) and associated with the active

Revista ARACÊ
ISSN: 2358-2472

participation of the community can contribute to the efficiency of GRS systems, ensuring that the actions adopted are compatible with local realities and promote social inclusion. Among the negative environmental and social externalities caused by poor GRS, there is the inadequate disposal of waste in areas close to water bodies, which increases environmental and public health risks (Sousa *et al.*, 2020; Shadi *et al.*, 2020), whose infiltration into the soil compromises the quality of surface and groundwater, affecting entire ecosystems, in addition to air contamination by burning that contributes to the greenhouse effect and attracts disease vectors such as flies and rats, worsening the health of the population (Conceição *et al.*, 2020; Georges and Gomes, 2021; Nogueira and Dantas, 2023).

The Sustainable Development Goals (SDGs) are a global agenda that aims to promote prosperity and protect the planet, addressing issues interconnected with economic development, social inclusion and environmental sustainability (UN, 2015). According to Wilson (2023), efficient waste and resource management (WaRM), considered an evolution of GRIS, is essential to achieving these goals, as it can reduce the amount of plastics entering the oceans by half, mitigate global warming, and contribute directly to 12 of the 17 SDGs.

In 2024, the report "Beyond the Age of Waste: Turning Waste into a Resource" by the Global Waste Management Outlook (GWMO) was published, which offers a comprehensive analysis on global waste generation and the costs associated with its management, underscoring the importance of WaRM for sustainable development and climate change mitigation (ISWA, 2024). In the 2018 report, GWMO adopted five global waste (GW) targets that are closely related to the SDGs: GW1 aims to universalize waste collection for all; GW2, the achievement of controlled waste disposal and the end of open burning corresponding to SDG 11.6.1; GW3 provides for the environmentally sound management of all waste, which mirrors SDG 12.4; GW4 aims to adopt recycling with the achievement of the 3Rs and is related to target 12.4 of the SDGs; and GW5 deals with the prevention of food waste, which corresponds to target 12.3 of the SDGs (GWMO, 2018).

Wilson (2023) points out that in the elaboration of the SDGs, neither solid waste management (SRM) nor air pollution were included as high-level objectives and remained pulverized in other SDGs. Rodic *et al* (2017) emphasise that the protection of public health was the main driving force behind the first attempts to introduce some form of solid waste collection in cities around the world hundreds of years ago and that the cross-cutting nature

Revista ARACÊ
ISSN: 2358-2472

of GRS and its impact on not just one but 12 SDGs, it should be a stimulus for its adoption as a political priority.

Vellis *et al* (2023) expose that sustainable urban planning is fundamental for the creation of resilient and inclusive cities (SDG 11), and SRM is part of this process, as it directly influences public health, environmental quality, and social cohesion, as well as the implementation of waste management systems that include selective collection, Recycling and composting can transform degraded urban landscapes into healthier, more livable spaces. Thus, the adoption of a circular economy, which aims at the reduction, reuse and recycling of waste (3Rs) can transform GR into a tool for sustainable development that, associated with policies to reduce inequalities, promotes the social and economic inclusion of waste collectors who often operate in precarious conditions and without formal recognition (Velis *et al.*, 2023). These different fronts of action not only improve the quality of life in cities, but also contribute to the mitigation of climate change and the protection of urban ecosystems.

PUBLIC SAFETY AND SOLID WASTE MANAGEMENT

Traditional approaches to public security, based on the Theory of Deterrence, were focused on repression and social control, with an emphasis on police action and the penal system, and have proven insufficient to deal with the complexity of criminal phenomena (Tyler, 2009; Zanetic *et al.*, 2016; Poncioni, 2022).

In Brazil, public security policies have undergone reformulations, especially after the promulgation of the Federal Constitution of 1988, seeking integrated approaches and a more decentralized and participatory management that involves not only security agencies, but also civil society and other spheres of government (Spaniol *et al*, 2020). The degradation of public space creates an environment conducive to criminality and can reduce the effectiveness of social control and increase the sense of impunity among residents (Lopes *et al*, 2022). The relationship between social vulnerability and the spatial location of violence has been widely studied, revealing consistent patterns of criminality in areas marked by social and economic exclusion.

Under the criminological approach, scholars of the Chicago School, under the influence of the changes that occurred in the early twentieth century, created the Ecological Theory addressing the relationship between space and criminality, providing a theoretical framework that seeks to understand how the configuration of space and the opportunities

Revista ARACÊ
ISSN: 2358-2472

present in certain areas can facilitate the occurrence of crimes (Park, Burgess and Mackenzie, 1984).

From the 1970s onwards, theorists such as Jefrey (1971), Newman (1972), Cohen and Felson (1979) Brantingham and Brantingham (1981) also focused their studies on the factors influencing criminality in the environment in which crime occurs. In the same vein, the Theory of Restrictive Environment analyzed that some urban environments have characteristics that attract and maintain criminal activities, creating a dynamic where the criminal feels simultaneously protected and imprisoned in spaces of restrictive environment marked by social vulnerabilities, income inequality and urban disorder, factors that contribute to violence in time and space (Dantas, 2022).

Thus, an exploratory analysis of spatial data can be used to identify *crime clusters* and allow measuring the relationship between physical space and crime incidence, showing how areas of high social vulnerability tend to have higher crime rates (Lopes *et al*, 2022). Moreira and Fochezatto (2018) point out that crime in the state of Bahia has a spatial distribution that reflects socioeconomic inequalities, with poorer and marginalized areas registering higher rates of violence. In turn, Sá (2019), when analyzing crime in Pernambuco, identified that homicides and robberies are concentrated in regions with high levels of social vulnerability.

According to De Sousa Lucas *et al* (2020), in the metropolitan region of Curitiba, violence is concentrated in specific territories, suggesting a spillover of crime between adjacent areas. These studies show that violence is not randomly distributed, but influenced by structural factors that affect certain locations more intensely.

Rolnik (1999) argues that territorial exclusion makes individuals and communities particularly vulnerable, opening up space for violence and conflict and is exacerbated by the absence of essential public services such as security, health and education that are often neglected in marginalized regions, an analysis reinforced by Moreira and Fochezatto (2018) in showing that crime is closely linked to socioeconomic conditions and lack of opportunities, creating a scenario where violence becomes a response to the adversities faced by local communities.

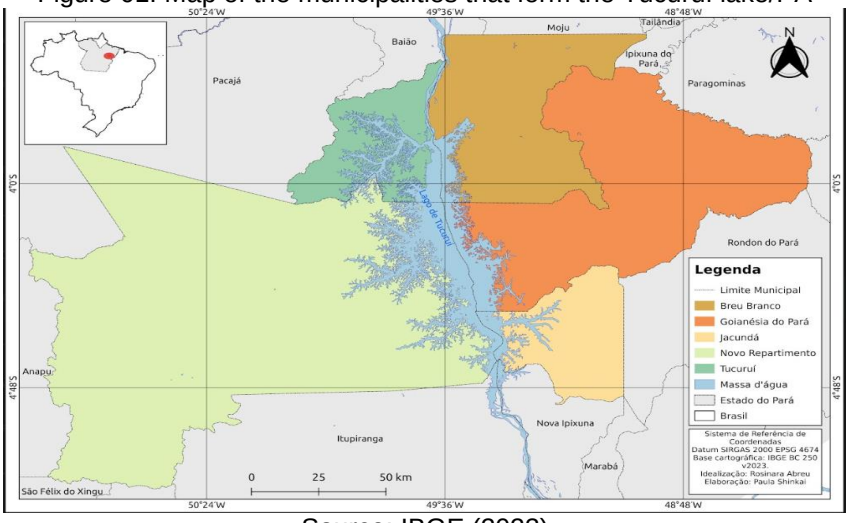
Revista ARACÊ
ISSN: 2358-2472

RESULTS AND DISCUSSION

FIELD OF STUDY

The research had as *locus* the municipalities of Breu Branco (BB), Goianésia (GOI), Jacundá (JAC), Novo Repartimento (NR) and Tucuruí (TUC) that make up the region of Lake Tucuruí and the Environmental Protection Area of Lake Tucuruí, established in 2002 by Law No. 6451, covering an area of 568,667 hectares that includes the reservoir of the Hydroelectric Power Plant (HPP) of Tucuruí and part of the territories of two more municipalities in the region, Itupiranga and Nova Ipixuna (Instituto Socioambiental, 2024).

Figure 01: Map of the municipalities that form the Tucuruí lake/PA



Source: IBGE (2023)

ANALYSIS OF SOCIO-ENVIRONMENTAL VULNERABILITY

In all the cities analyzed, inefficient management of MSW is identified, whose final destination is still carried out in open air dumps.

Ipea - ivs

The Social Vulnerability Index (IVS), developed by IPEA, is a tool that allows measuring the probability of individuals or families being in situations of poverty and social exclusion. It is calculated from 16 indicators, grouped into three dimensions: Urban Infrastructure (IEU), Human Capital (HC), and Income and Labor (RT) that incorporate multidimensional aspects of social well-being such as working conditions and income, access to education and health, and quality of urban infrastructure, including transportation, housing, and sanitation. The IVS methodology uses a normalization calculation of the 16 indicators on a scale of 0 to 1, in which 0 represents the ideal situation (absence of vulnerability) and 1 represents the worst possible situation. The final index is

Revista ARACÊ
ISSN: 2358-2472

obtained by the arithmetic mean of the three sub-indices, each with equal weight. The SVI is evaluated according to bands with color variation that indicate greater or lesser vulnerability.

Table 01: Dimensions and indexes of the IVS – 2000/2010 – BB, GOI, JAC, NR and TUC

IPEA – IVS	YEAR	TUC	BB	NR	GOI	JAC
Urban Infrastructure Dimension	2000	0,458	0,576	0,833	0,745	0,738
	2010	0,242	0,428	0,674	0,639	0,546
% of people in households with inadequate water supply and sanitation % of the population living in urban households without a health service Garbage collection % of people who live in households with a per capita income of less than half a minimum wage and who spend more than one hour to work in the total number of employed, vulnerable people who return to work daily						
Human Capital Dimension	2000	0,550	0,767	0,833	0,745	0,738
	2010	0,468	0,616	0,674	0,639	0,546
mortality rate up to one year of age % of children aged 0-5 years not attending school % of children aged 6-14 who do not attend school % of women aged 0-17 years who have had children % of mothers who are heads of household and do not complete primary school and have at least one child under 15 years of age illiteracy rate of the population aged 15 and over % of children living in households where none of the residents has completed primary education % of persons aged 15 to 24 who do not study, do not work and have a per capita household income equal to or less than half a minimum wage (2010), in the total population of this age group						
Income and Work Dimension	2000	0,502	0,545	0,597	0,532	
	2010	0,348	0,539	0,518	0,469	
% of persons with per capita household income equal to or less than 1/2 minimum wage (2010) unemployment rate of the population aged 18 and over % of persons aged 18 and over without complete primary education and in informal occupation % of persons with per capita household income equal to or less than 1/2 minimum wage (2010) and dependents of the elderly activity rate of people aged 10 to 14 years						
IVS Total	2000	0,503	0,629	0,699	0,636	0,656
IVS Total	2010	0,353	0,528	0,542	0,503	0,497

Source: IPEA – Atlas of Social Vulnerability, 2015.

In the state of Pará, the IVS data for the years 2000 and 2010 reveal a positive variation in all dimensions of the IVS in the 143 municipalities of Pará, however, the state remained in the range of very high social vulnerability (Araújo, 2017). In the cities analyzed, according to the 2010 Census, Tucuruí is in the medium vulnerability range, Jacundá, in the high to very high vulnerability traffic and Breu Branco, Novo Repartimento and Goianésia occupy the very high vulnerability range.

Revista ARACÊ
ISSN: 2358-2472

Table 02: Social vulnerability ranges – IPEA

0	0.200	0.300	0.400	0.500	1
Very low	Low	Average	Discharge	Very high	

Tucuruí (0,353); Jacundá (0,497); Goianésia do Pará (0,503); Breu Branco (0.528); New Repartimento (0,542)

Source: IPEA – Atlas of Social Vulnerability, 2015.

In the comparative analysis according to the 2000 and 2010 censuses, all municipalities showed a reduction in the IVS between 2000 and 2010, with Tucuruí being the municipality that presented the highest percentage reduction (29.82%), followed by Jacundá with 24.24%. Breu Branco had the lowest percentage reduction (16.06%) and Novo Repartimento had the highest SVI in the region analyzed both in the 2000 (0.699) and 2010 (0.542) censuses. In the state of Pará, the IVS data for the years 2000 and 2010 reveal a positive variation in all dimensions of the IVS in the 143 municipalities of Pará, however, the state remained in the range of very high social vulnerability (Araújo, 2017).

The correlation analysis of the components of the IEU dimension indicates that municipalities with a higher percentage of people in households with inadequate water supply and sewage and without garbage collection are more vulnerable.

Vulnerability analysis according to IPS Brazil and IPS Amazônia

The Social Progress Index (SPI) is a tool developed by the Social *Progress Imperative* to measure the social and environmental performance of territories, regardless of economic indicators. In the IPS Global 2024, Brazil achieved a score of 68.90 and ranked 67 out of 170 countries evaluated. In Public Security, the country ranked 122nd, with the indicators absence of a sense of security (40.90) and the rate of interpersonal violence (46.40) contributing the most to its low position (IPS Brasil, 2024).

The IPS Brazil and IPS Amazônia present their results by municipal *scorecards*, displaying scores (0-100) and classifications relative to the universe of the sample (x/5.570-x/772). In the analysis, the GDP *per capita is included,* allowing us to analyze whether the result obtained is within the parameters expected for that economic group. In addition, the indices use a color system (blue, yellow, red) that situate the performance in comparison to municipalities with similar GDP. The analysis considers three aspects: score, classification, and lighthouse, providing a comprehensive view of municipal social progress (Wilm *et al*., 2024).

Revista ARACÊ
ISSN: 2358-2472

The IPS Brazil 2024 covers the 5,570 Brazilian municipalities and its methodology is based on four principles: use of exclusively social and environmental indicators, focus on effective results, serve as a subsidy for public policies and private investments, and the search for a comprehensive approach, applicable to different geographic scales, from countries to local communities (Stern *et al.* 2024). The index comprises the dimensions: Basic Human Needs (NHB), Fundamentals of Well-being (FBE) and Opportunities (OPO), subdivided into 12 components and 53 indicators whose data were collected from sources such as DataSUS, Sisvan/Ministry of Health, Ministry of Citizenship, National Sanitation Information System (Snis), National Institute of Educational Studies and Research Anísio Teixeira (Inep), National Institute for Space Research (Inpe), National Council of Justice (CNJ), Brazilian Institute of Geography and Statistics (IBGE), Mapbiomas, Anatel and CadÚnico.

Table 03: Descriptive table of the indexes and components of the IPS Brazil and the IPS Amazônia

IPS BRAZIL			IPS AMAZONIA		
DIMENSIONS			DIMENSIONS		
BASIC HUMAN NEEDS	FUNDAMENTALS FOR WELL-BEING	OPPORTUNITIES	BASIC HUMAN NEEDS	FUNDAMENTALS FOR WELL-BEING	OPPORTUNITIES
Nutrition and Basic Medical Care 1. Vaccination Coverage (polio) 2. Hospitalizations for Ambulatory Care-Sensitive Conditions 3. Ambulatory Care-Sensitive Condition Adjusted Mortality 4. Infant Mortality up to 5 years old 5. Malnutrition	Access to Basic Knowledge 1. Dropout in Elementary School 2. High School Dropout 3. High School Dropout 4. Age-Grade Distortion in High School 5. Ideb Elementary School 6. School Failure in Elementary School	Individual Rights 1. Access to Human Rights Programs 2. Existence of Actions for Minority Rights 3. Index of Compliance with the Demand for Justice 4. Net Process Congestion Rate	Nutrition and basic medical care 1. Infant mortality up to 5 years old 2. Maternal mortality 3. Mortality from infectious diseases 4. Mortality from malnutrition 5. Malnutrition	Access to basic knowledge 1. Age-grade distortion of elementary school 2. Age-grade distortion of high school 3. Elementary school dropout rate 4. Elementary school failure rate 5. Quality of education (Ideb)	Individual rights 1. Party diversity 2. Urban mobility (public transport) 3. Access to programmes and human rights 4. Existence of actions for minority rights
Water and Sanitation 1. Water Supply via Distribution Network 2. Adequate sanitary sewage 3. Water Supply Index	Access to Information and Communication 1. Mobile Internet Coverage (4G/5G) 2. Fixed Broadband Internet Density	Individual Freedoms and Choice 1. Access to Culture, Leisure and Sport 2. Teenage Pregnancy > 19 years	Water and sanitation 1. Water Supply Index 2. Adequate water supply 3. Adequate sanitary sewage	Access to Information and Communication 1. Fixed broadband internet density 2. Fixed telephony density	Individual Freedom and Choice 1. Access to culture and leisure 2. Family vulnerability (%

Revista ARACÊ
ISSN: 2358-2472

4. Distribution Water Loss Index	3. Mobile Phone Density 4. Mobile Internet Quality	3. Squares and Parks in Urban Areas 4. Child Labor		3. Mobile phone density 4. Pay TV Density	of single mothers) 3. Teen Mothers or Children 4. Child labor
Residence 1. Households with Adequate Waste Collection 2. Homes with Adequate Electric Lighting 3. Homes with Adequate Walls 4. Homes with Adequate Floors	Health and Wellness 1. Life Expectancy 2. Mortality between 15 and 50 Years 3. Mortalities from Chronic Noncommunicable Diseases 4. Obesity 5. Suicides	Social inclusion 1. Gender Parity in the City Council 2. Parity of Blacks and Browns in the City Council 3. Violence against Indigenous People 4. Violence against Women 5. Violence against Black People	Residence 1. Proper garbage collection 2. Homes with adequate electric lighting 3. Homes with adequate walls 4. Homes with adequate floors	Health and Wellness 1. Mortality diseases circulatory system 2. Mortality, diseases, respiratory system 3. Mortality from diabetes mellitus 4. Mortality from neoplasms (cancer) 5. Suicide rate	Social inclusion 1. Violence against indigenous people 2. Violence against women 3. Child violence
Personal Safety 1. Murders of Young People 2. Murders of Women 3. Deaths from Traffic Accidents 4. Homicides	Environmental Quality 1. Urban Green Areas 2. CO2 emissions per inhabitant 3. Heat Sources 4. Climate Vulnerability Index of Municipalities 5. Suppression of Primary and Secondary Vegetation	Access to Higher Education 1. Employees with Higher Education 2. Employed Women with Higher Education 3. Average Grade in Enem	Personal safety 1. Murders of young people 2. Homicides 3. Deaths from traffic accidents	Environmental Quality 1. Protected Areas 2. Recent deforestation 3. Accumulated deforestation 4. CO2 emissions 5. Heat sources	Access to higher education 1. Employees with higher education 2. Employed women with tertiary education

Source: IPS Brazil 2024 and IPS Amazon 2023

The IPS Amazonia, whose first publication is in 2014, covers the 772 municipalities of the Legal Amazon, being a regional adaptation of the IPS and uses indicators that reflect the social reality of the region, but employs the same statistical methodology as the Global IPS and aims to answer the same key questions: A given society has the capacity to satisfy basic human needs, does it have the structures that guarantee quality of life for its citizens and offer opportunities for all individuals to reach their full potential?

Revista ARACÊ
ISSN: 2358-2472

The following table shows the three dimensions of the IPS Brazil and the IPS Amazônia of the municipalities analyzed, indicating the score, components, classification and color indicative of their position in the IPS.

Table 04: Table of dimensions, components, score and indicative color - IPS Brasil - IPS Amazônia

	IPS-AMAZONIA-2023					IPS-BRAZIL-2024				
Municipality	BB	GOI	JAC	NR	TUC	BB	GOI	JAC	NO	TUC
Note (Position)	53,05 (459)	53,22 (440)	52,13 (542)	53,95 (388)	51,54 (601)	52,08 (4964	47,05 (5466)	51,08 (5143)	50,19 (5251)	55,6 (3902)
NHB Dimension	60,62 (587)	59,07 (633)	63,58 (446)	53,19 (744)	63,67 (439)	59,40 (5127)	53,77 (5442)	58,20 (5229)	50,67 (5515)	70,60 (3159)
• Nutrition and basic medical care	89,82 (164)	91,51 (51)	90,21 (134)	85,98 (528)	88,37 (326)	70,82 (2481)	72,56 (1889)	65,83 (4094)	72,54 (1896)	73,46 (1579)
• Water and Sanitation	22,10 (668)	30,01 (567)	30,09 (564)	14,61 (729)	45,62 (248)	28,83 (5449)	45,52 (4935)	31,07 (5403)	18,99 (5543)	87,52 (818)
• Residence	78,06 (473)	71,13 (595)	82,66 (365)	67,54 (644)	86,19 (282)	78,65 (4759)	70,94 (5218)	82,98 (4233)	65,46 (5367)	82,30 (4319)
• Personal Safety	52,51 (340)	43,63 (557)	51,38 (361)	44,65 (528)	34,51 (733)	59,30 (3430)	26,06 (5319)	52,91 (4129)	45,67 (4632)	39,12 (4965)
Fundamentals of well-being	53,90 (615)	54,60 (577)	51,97 (699)	54,67 (572)	58,64 (316)	53,75 (5186)	47,67 (5500)	56,79 (4758)	48,16 (5491)	60,65 (3681)
• Access to basic knowledge	69,41 (496)	67,52 (535)	62,36 (630)	64,53 (595)	71,23 (440)	51,72 (5381)	48,21 (5475)	54,67 (5242)	55,43 (5196)	61,31 (4731)
• Access to information and communication	6,07 (672)	6,64 (632)	8,73 (502)	6,77 (627)	10,33 (396)	51,98 (4233)	53,46 (4014)	62,87 (2392)	44,85 (4995)	62,61 (2447)
• Health and well-being	85,97 (245)	88,34 (138)	82,18 (436)	89,89 (89)	86,86 (198)	60,41 (1522)	45,24 (5250)	50,18 (4707)	58,63 (2146)	58,71 (2118)
• Quality of the environment	54,15 (579)	55,92 (540)	54,61 (569)	57,49 (513)	66,13 (336)	50,89 (5145)	43,76 (5353)	59,43 (4574)	33,73 (5483)	59,97 (4508)
Opportunities	44,64 (166)	46,00 (124)	40,83 (353)	53,97 (11)	32,30 (697)	43,10 (1634)	39,71 (2887)	38,24 (3435)	51,75 (128)	35,54 (4357)
• Individual rights	30,41 (217)	35,42 (130)	34,54 (146)	68,30 (1)	37,85 (102)	37,45 (895)	42,02 (493)	43,28 (406)	72,30 (3)	43,11 (420)
• Individual freedoms and choices	49,49 (293)	45,73 (432)	53,24 (181)	47,80 (355)	51,84 (227)	27,15 (4945)	25,03 (5137)	39,67 (2895)	28,58 (4785)	33,11 (4127)
• Social inclusion	90,76 (96)	91,09 (65)	69,06 (543)	91,05 (67)	26,76 (762)	85,22 (533)	64,64 (2595)	43,46 (4373)	80,80 (1002)	32,08 (5156)
• Access to higher education	7,88 (597)	11,75 (368)	6,48 (658)	8,74 (547)	12,78 (318)	22,59 (4263)	27,14 (3124)	26,55 (3271)	25,33 (3580)	33,86 (1621)
	Group of municipalities with the same GDP per *capita range,* according to a report available in https://www.ipsamazonia.org.br Relatively STRONG Relatively NEUTRAL Relatively WEAK					Performance in relation to the group of municipalities with the same GDP per *capita range,* according to a report available in https://ipsbrasil.org.br Relatively STRONG Relatively NEUTRAL Relatively WEAK				

Source: IPS Brazil 2024 and IPS Amazon 2023

Revista ARACÊ
ISSN: 2358-2472

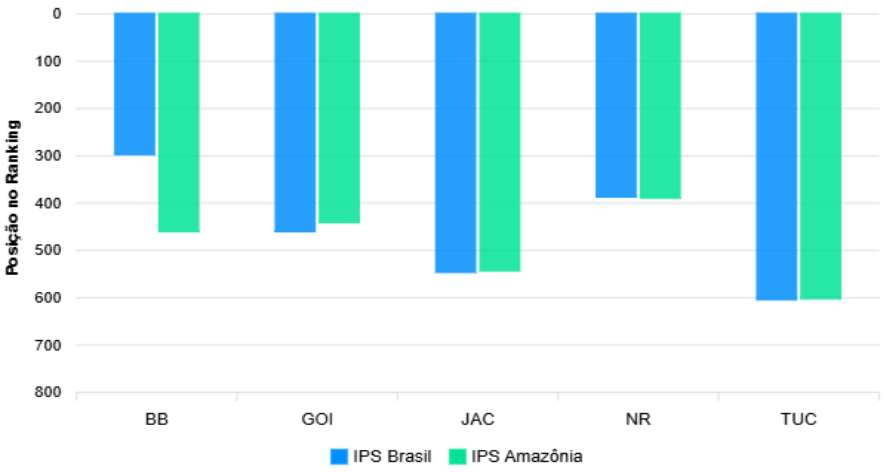
Table 05: Comparative table of municipalities and their scores in IPS Brasil/IPS Amazônia

Municipality	IPS Amazonia 2023	IPS Brazil 2024	Difference
New Repartimento	53.95 (388th)	50,19 (5251º)	-3,76
Goianésia do Pará	53.22 (440th)	47,05 (5466º)	-6,17
Breu Branco	53.05 (459th)	52,08 (4964º)	-0,97
Jacundá	52.13 (542nd)	51,08 (5143º)	-1,05
Tucuruí	51.54 (601st)	55,60 (3902º)	+4,06

Source: IPS Brazil 2024 Report

Novo Repartimento has the best score in OPO (53.97), followed by Goianésia do Pará, Breu Branco, Jacundá and Tucuruí, which has the best scores in NHB (63.67) and FBE (58.64). Goianésia do Pará balances NHB (59.07) and FBE (54.60), with a good score in OPO (46.00). Breu Branco and Jacundá have mixed performances, with a negative highlight in NHB and FBE. The OPO dimension presents greater variability between municipalities.

Figure 02: Positioning IPS Brazil vs. IPS Amazônia



Source: IPS Brazil 2024/IPS Amazon 2023

Comparative analysis of the Brazil SPI with municipalities in each Brazilian region

For the comparative analysis in the national context of the IPS Brazil 2024, one municipality from each Brazilian region was selected in the same range of GDP *per capita* and population as the municipalities in the Tucuruí Lake region.

Revista ARACÊ
ISSN: 2358-2472

Table 06: Comparative data – IPS Brazil 2024 – Breu Branco

MUNICIPALITY	POP.	GDP PER CAPITA	IPS BRAZIL	NHB	FBE	OPO
Breu Branco (PA)	45.712	17.503,23	52.08	59.40	53.75	43.10
Eirunepé (AM)	33.170	17.250,10	44.82	54.45	52.65	27.36
Cruz das Almas (BA)	60.348	17.399,34	58.35	68.99	67.20	47.86
American from Brazil (GO)	5.259	17.506,60	57.44	77.04	59.04	36.25
Alto Chapel (SP)	22.866	17.284,10	61.23	79.30	68.11	36.28
Balneário Barra do Sul (SC)	14.912	17.194,08	58.55	80.31	67.71	27.62

Source: IPS Brazil 2024

Breu Branco (PA) has an overall score of 52.08, below the average of the municipalities compared (55.41). It stands out negatively in the NHB (nutrition, medical care, water, sanitation, housing and personal security) and FBE (access to knowledge, information, health and environmental quality) dimensions, but outperforms the average in the OPO (individual rights, freedom, tolerance and higher education) dimensions. In the regional context, it surpasses Eirunepé (AM), indicating common challenges in the northern region.

Table 07: Comparative data – IPS Brazil 2024 – Goianésia do Pará

MUNICIPALITY	POP.	GDP PER CAPITA	IPS BRAZIL	NHB	FBE	OPO
Oiapoque (AP)	27.482	19.386,51	48.22	49.22	60.93	34.51
Goianésia do Pará (PA)	26.362	R$ 19.358,79	53.77	65.37	54.76	41.19
Pigeons (PE)	27.552	19.471,21	55.42	67.78	61.51	36.97
Barbosa (SP)	5.640	19.489,65	62.19	80.52	69.77	36.28
Araçu (GO)	3.799	19.487,37	64.15	84.09	66.08	42.29
Major Gercino (SC)	3.214	19.473,42	64.46	82.75	66.23	44.41

Source: IPS Brazil 2024

Goianésia do Pará is 4.93 points below the general average (58.04) in the IPS Brazil, with a critical performance in NHB (-6.8) and FBE (-9.12), but exceeds the average in OPO (+1.32). Challenges include basic education, health, environmental quality, infrastructure, water, sanitation and public safety. In the regional context, it surpasses Oiapoque, indicating common challenges in the northern region.

Revista ARACÊ
ISSN: 2358-2472

Table 08: Comparative data – IPS Brazil 2024 – Jacundá

Municipality	POP.	GDP PER CAPITA	IPS BRAZIL	NHB	FBE	OPO
Jacundá (PA)	37.707	16.447,60	51,08	58,20	56,97	38,24
Rio Preto da Eva (AM)	24.936	16.446,83	53,73	65,30	60,80	35,09
Major Isidoro (AL)	17.700	16.129,60	54,72	61,42	62,65	40,08
Almirante Tamandaré (PR)	119.825	16.277,98	57,73	75,88	65,22	32,09
Itambacuri (MG)	21.042	16.326,7	59,96	71,06	60,69	39,14
Combined (TO)	4.756	16.207,45	60,68	79,23	65,17	37,65

Source: IPS Brazil 2024

Jacundá has the lowest Overall SPI (51.08) of the group, being 9.60 points below Combined (TO). In NHB, it is 12.38 points below the average (70.58), with weaknesses in water and sanitation. In FBE, it is 5.94 points below (62.91). In OPO, it exceeds the average (36.81) with 38.24, standing out in rights and freedoms.

Table 09: Comparative data – IPS Brazil 2024 – New Repartimento

Municipality	POP.	GDP PER CAPITA	IPS BRAZIL	NHB	FBE	OPO
Novo Repartimento (PA)	60.732	18.527,11	50.19	50.67	48.16	51.75
Alto Alegre (RR)	21.096	18.407,34	50.53	57.07	58.24	36.29
Flores de Goiás (GO)	13.744	18.391,14	53.57	66.58	56.75	38.00
Serra Talhada (PE)	92.228	18.494,47	58.35	72.86	68.15	39.16
Mutum (MG)	27.635	18.537,93	60.89	68.25	66.70	38.36
Balneário Rincão (SC)	15.981	18.569,97	61.82	76.57	67.71	41.17

Source: IPS Brazil 2024

Novo Repartimento is 5.94 points below the general average (55.89), with critical performances in NHB (-17.33) and FBE (-13.29), but surpasses the municipalities compared in OPO (+11.79). It has a performance similar to Alto Alegre (RR), reflecting identity in the regional challenges. Balneário Rincão (SC) and Mutum (MG) lead the sample.

Table 10: Comparative data – IPS Brazil - Tucuruí

Municipality	POP.	GDP PER CAPITA	NHB	FBE	OPO	IPS Brazil
Voice (MA)	101.767	62.433,36	68.28	60.95	43.25	57.49
Tucuruí (PA)	91.306	61.939,93	70.60	60.65	35.54	54.56
Pedro Afonso (TO)	14.055	60.822,93	73.24	65.13	44.35	60.91
Goiatuba (GO)	35.664	61.273,83	76.94	66.10	47.74	63.59
João Monlevade (MG)	80.187	60.940,74	80,73	67,72	55.40	70,84
Bento Gonçalves (RS)	123.151	61.333,14	85.21	70.84	55.40	70.48

Source: IPS Brazil 2024

Revista ARACÊ
ISSN: 2358-2472

In the comparative analysis, Tucuruí is 6.35 points below Pedro Afonso (TO) and 15.92 below Bento Gonçalves (RS). It presents a critical performance in FBE and OPO, showing that economic development does not reflect positively on social progress. Its performance in the IPS Brazil is slightly higher than that of Balsas (MA), indicating similar regional challenges.

FINAL CONSIDERATIONS

The study on socio-environmental vulnerability and public safety in dump areas in the region of the Lake of the Tucuruí Hydroelectric Power Plant highlights the complexity and interconnection between environmental, social and public safety factors. Using the Social Vulnerability Index (SVI) and the Social Progress Index (SPI), the study revealed how poor urban infrastructure, inadequate water supply, and lack of garbage collection contribute to increasing the vulnerability of local communities. The analysis of crime in these municipalities showed the interrelationship between environmental degradation and the increase in violence, highlighting the need for public policies that integrate social, economic and cultural aspects.

The study faced limitations, such as the dependence on data of varying quality and the specific time frame, which may have influenced the results. In addition, the time lag of the IVS-IPEA in relation to the most recent data may have impacted the accuracy of the conclusions.

Despite this, the data that resulted from the research can serve as a tool for the formulation of integrated public policies, which consider the intersection between waste management, urban infrastructure and public safety. The research highlights the importance of a holistic approach to addressing socio-environmental and security challenges, promoting more sustainable and equitable development in the region.

For future work, it is recommended to develop new research that explores the perception of local communities about the proposed interventions, ensuring that the solutions developed meet their needs and expectations. The integration of more recent and comprehensive data can also contribute to the accuracy of the analyses, allowing for a more detailed understanding of the socio-environmental and safety dynamics in the Tucuruí Hydroelectric Power Plant Lake region. These efforts will contribute to more effective planning and more sustainable management of local resources and challenges.

Revista ARACÊ
ISSN: 2358-2472

REFERENCES

1. ABRELPE – Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais. (2021). Panorama dos resíduos sólidos no Brasil 2021. Disponível em https://abrelpe.org.br/panorama-2021. Acesso em 07 dez. 2023.

2. Acserald, H. (1991). Planejamento autoritário e desordem socioambiental na Amazônia: crônica do deslocamento de populações em Tucuruí. Revista de Administração Pública, 25(4), 53–68. Recuperado de https://periodicos.fgv.br/rap/article/view/8897

3. Araújo, F. R. S. de. (2017). A vulnerabilidade social no estado do Pará. In B. O. Marguti, M. A. Costa, & C. B. Favarão (Orgs.), Territórios em números: Insumos para políticas públicas a partir da análise do IDHM e do IVS de UHDs e regiões metropolitanas brasileiras (Livro 2, pp. 111–153). Repositório do Conhecimento do IPEA.

4. Batista, M., Caiado, R. G. G., Quelhas, O. L. G., Lima, G. B. A., Leal Filho, W., & Yparraguirre, I. T. R. (2021). A framework for sustainable and integrated municipal solid waste management: Barriers and critical factors to developing countries. Journal of Cleaner Production, 312. https://doi.org/10.1016/j.jclepro.2021.127516

5. Brasil. (2022, abril 13). Lei nº 11.043, que institui o Plano Nacional de Resíduos Sólidos e dá outras providências. Diário Oficial da União, seção 1.

6. Brasil. Ministério do Desenvolvimento Regional. (2021). Sistema Nacional de Informações sobre Saneamento: diagnóstico dos serviços de água e esgotos – 2021. Brasília, DF: MDR.

7. Brantingham, P. J., & Brantingham, P. L. (1981). Environmental criminology. Sage Publications.

8. Chagas, C. A. N., Silva, C. N., & Silva, J. M. P. (2013). Uso de ferramentas de geoinformação na prevenção e combate à criminalidade na Região Metropolitana de Belém, Estado do Pará. Anais do XIV Encontro de Geógrafos da América Latina, Lima.

9. Chen, X., Geng, Y., & Fujita, T. (2010). Uma visão geral da gestão de resíduos sólidos municipais na China. Gestão de Resíduos, 30(4), 716–724. https://doi.org/10.1016/j.wasman.2009.10.011

10. Cohen, L., & Felson, M. (1979). Change and crime rate trends: A routine activity approach. American Sociological Review, 44, 588–608.

11. Conceição, M. M. M., et al. (2020). Qualidade ambiental do vazadouro a céu aberto de Castanhal-PA. Brazilian Journal of Development, 6(3), 12760–12775.

12. Da Silva Leal, F. C. B., Barbosa, I. M. B. R., & De Aquino, J. T. (2020). Mapeamento de áreas vulneráveis à inundação com uso do SIG e da análise multicritério: o caso da Bacia Hidrográfica do rio Una em Pernambuco. Revista Gestão & Sustentabilidade Ambiental, 9, 20–40.

Revista ARACÊ
ISSN: 2358-2472

13. De Sousa Lucas, M., Da Cunha, M. S., & De Lucas Bondezan, K. (2020). Determinantes socioeconômicos da criminalidade no estado do Paraná: uma análise espacial. Revista de Economia, 41(75).

14. Dantas, R. F. (2022). Violência e vulnerabilidades urbanas: teoria da ambiência restritiva. Dilemas: Revista de Estudos de Conflito e Controle Social, 15(1), 277–302.

15. Das Mercês, J. A. S., De Castro, F. F., & Cañete, V. R. (2019). Memória do excesso: vivência do deslocamento compulsório pela Hidrelétrica de Tucuruí. Novos Cadernos NAEA, 22(2).

16. De Oliveira, C. A. F., Teixeira, L. M. S., & Da Silva Medina, G. (2022). Política de segurança pública para propriedades rurais: Patrulha Rural de Catalão/GO. Revista Brasileira de Segurança Pública, 16(3), 204–223.

17. Downs, M., & Medina, M. (2000). A short history of scavenging. Comparative Civilizations Review, 42(42), 4.

18. Estellita, H., Ferreira, C. C., & Matsuda, F. E. (2012). O homicídio em três cidades brasileiras. Centro de Pesquisa Jurídica Aplicada (CPJA).

19. Georges, L. H., & Gomes, E. R. (2021). Diagnóstico ambiental do lixão do município de Pedro II–Piauí como ferramenta para gestão de resíduos. Revista da Academia de Ciências do Piauí, 2, 74–86.

20. Gonçalves, C. S., et al. (2022). Mapeamento de fontes geradoras de resíduos de serviços de saúde através da utilização de SIG. Sociedade & Natureza, 32, 15–26.

21. Governo do Estado do Pará. Fundação Amazônia de Amparo a Estudos e Pesquisa-FAPESPA. (2021). Região de Integração do Marajó–Perfil Socioeconômico e Ambiental.

22. Instituto Socioambiental. (2024). Parque Nacional do Jaú. Disponível em https://uc.socioambiental.org/. Acesso em 25 mar. 2024.

23. IPEA – Instituto de Pesquisa Econômica Aplicada. (2015). Atlas da vulnerabilidade social nos municípios brasileiros. Brasília. Disponível em https://repositorio.ipea.gov.br/handle/11058/4381. Acesso em 10 jun. 2024.

24. Lopes, P. L. de S., & Russo, A. C. (2022). Policiamento previne o crime? A eficiência das atividades policiais voltadas ao controle e prevenção da criminalidade. Revista Brasileira de Estudos de Segurança Pública, 15(2). https://doi.org/10.29377/rebesp.v15i02.643

25. Maiello, A., Britto, A. L. N. P. de, & Valle, T. F. (2018). Implementação da política nacional de resíduos sólidos. Revista de Administração Pública, 52, 24–51.

Revista ARACÊ
ISSN: 2358-2472

26. Marshall, R. E., & Farahbakhsh, K. (2013). Abordagens sistêmicas para resíduos sólidos integrados gestão nos países em desenvolvimento. Gestão de Resíduos, 33(4), 988–1003. https://doi.org/10.1016/j.wasman.2012.12.023

27. Moreira, R. C., & Fochezatto, A. (2018). Análise espacial da criminalidade no estado da Bahia. Revista de Desenvolvimento Econômico, 3(38), 52–80.

28. Nascimento, F. A. A., & Filho, J. L. O. P. (2021). Os impactos ambientais dos resíduos sólidos urbanos. Enciclopédia Biosfera, 18(38), e217.

29. Newman, O. (1973). Defensible space: Crime prevention through urban design. New York: Collier Books.

30. Nogueira, V. F. B., & Dantas, J. S. (2023). Impactos ambientais causados por descarte de resíduos sólidos urbanos em vazadouros a céu aberto e a implantação da Política Nacional de Resíduos Sólidos nos municípios brasileiros. In Impactos Ambientais em Região Semiárida. UFCG.

31. Pará. Secretaria Adjunta de Inteligência e Análise Criminal (SIAC). (2024). Indicadores de criminalidade Breu Branco, Goianésia do Pará, Jacundá, Novo Repartimento, Tucuruí 2020-2023 [Dados não publicados].

32. Pará. Sistema Integrado de Segurança Público (SISP). (2024). Boletins de Ocorrência Goianésia do Pará, Jacundá, Novo Repartimento, Tucuruí 2020-2023 [Dados não publicados].

33. Park, R. E., Burgess, E. W., & McKenzie, R. (1984). The city: Suggestions for investigation of human behavior in the urban environment. Chicago: Midway. Disponível em https://www.academia.edu/35847233/The_City_Suggestions_for_Investigation_of_Human_Behavior_in_the_Urban_Environment. Acesso em 4 abr. 2024.

34. Pereira, J. C. M. (2022). Cidade e hidrelétrica na Amazônia brasileira: espaço e memória entre o “velho” e o “novo” Repartimento (Pará). Novos Cadernos NAEA, 25(2).

35. Pessoa Neto, A. G., Rosa da Silva, S., & Beltrão Rameh Barbosa, I. M. (2022). Mapeamento das áreas suscetíveis às inundações e aos alagamentos no município de Jaboatão dos Guararapes, Pernambuco. Boletim de Geografia, 40.

36. Poncioni, P. F. (2022). A questão da legitimidade policial na democracia – a educação policial em foco. Revista Brasileira de Segurança Pública, 16(1), 14–29.

37. Santana, A. C. de, et al. (2014). Influência da barragem de Tucuruí no desempenho da pesca artesanal, estado do Pará. Revista de Economia e Sociologia Rural, 52, 249–266.

38. Santos, D., Lima, M., Wilm, M., Seifer, P., & Veríssimo, B. (2023). Índice de Progresso Social na Amazônia Brasileira: IPS Amazônia 2023. Belém: Instituto do Homem e

Revista ARACÊ
ISSN: 2358-2472

Meio Ambiente da Amazônia. Disponível em: https://imazon.org.br/publicacoes/ips-amazonia-2023/. Acesso em 20 jul. 2024.

39. Selau, C. C. (2018). Gestão e gerenciamento de resíduos sólidos no município de Criciúma/SC. Gestão de Resíduos Sólidos no Município de Criciúma/SC, 1–18.

40. Shadi, A. M. H., et al. (2020). Characterization of stabilized leachate and evaluation of LPI from sanitary landfill in Penang, Malaysia. Desalination and Water Treatment, 189, 152–164.

41. Spaniol, M. I., Moraes Jr, M. C., & Rodrigues, C. R. G. (2020). Como tem sido planejada a Segurança Pública no Brasil? Análise dos Planos e Programas Nacionais de Segurança implantados pós-redemocratização. Revista Brasileira de Segurança Pública, 14(2), 100–127.

42. Social Progress Imperative. (2024). The 2024 Social Progress Index results. Washington, DC: Social Progress Imperative. Disponível em www.socialprogress.org. Acesso em 11 nov. 2024.

43. Stern, S., Harmacek, J., Krylova, P., & Htitich, M. (2024). Social Progress Index Methodology summary. Washington, DC: Social Progress Imperative. Disponível em www.socialprogress.org. Acesso em 11 nov. 2024.

44. Tyler, T. R. (2009). Legitimacy and criminal justice: the benefits of self-regulation. Ohio State Journal of Criminal Law, 7(1), 307–359.

45. Velis, C. A., et al. (2023). Socio-economic development drives solid waste management performance in cities: A global analysis using machine learning. Science of the Total Environment, 872, 161913. https://doi.org/10.1016/j.scitotenv.2023.161913. Acesso em 10 abr. 2023.

46. Wilson, D. C. (2023). Learning from the past to plan for the future: An historical review of the evolution of waste and resource management 1970–2020 and reflections on priorities 2020–2030 – The perspective of an involved witness. Waste Management & Research, 41(12). https://doi.org/10.1177/0734242X231178025. Acesso em 10 abr. 2023.

47. Wilson, D. C., et al. (2007). Using research-based knowledge to underpin waste and resources policy. Waste Management & Research, 25(3), 247–256.

48. Whiteman, A., Webster, M., & Wilson, D. C. (2021). The nine development bands: A conceptual framework and global theory for waste and development. Waste Management & Research, 39(10), 1218–1236.

49. Zanetic, A., Manso, B. P., Natal, A. L., & Oliveira, T. R. (2016). Legitimidade da polícia: segurança pública para além da dissuasão. Civitas: Revista de Ciências Sociais, 16(4), e148–e173. https://doi.org/10.15448/1984-7289.2016.4.24183. Disponível em https://revistaseletronicas.pucrs.br/civitas/article/view/24183. Acesso em 11 jan. 2025.