







Agenda 21 as a reference for the development of sustainable public policies in cities of Brazil (1999-2023)

Agenda 21 como referencia para el desarrollo de políticas públicas sostenibles en ciudades de Brasil (1999-2023)

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Analyzing the role of Agenda 21 as a framework for guiding the development of sustainable public policies in cities of Brazil over the period from 1999 to 2023. Providing insights into the effectiveness of Agenda 21 in fostering collaboration between government entities, civil society organizations, and the private sector to address environmental challenges and achieve long-term sustainability goals in Brazilian cities. Offering recommendations for enhancing the implementation of Agenda 21 principles and practices in urban policymaking processes, thereby contributing to the advancement of science and technology in the field of sustainable urban development. Interdisciplinary approach, embrace interdisciplinary perspectives to explore diverse fields of knowledge and uncover connections between them. This allows for a holistic understanding of complex phenomena and promotes innovation through the integration of different disciplines. Contextual understanding, recognize the importance of context in shaping knowledge generation. Consider social, cultural, historical, and environmental factors that influence the production and dissemination of knowledge across different communities and regions. Critical thinking, foster critical thinking skills to question assumptions, challenge existing paradigms, and evaluate evidence rigorously. This involves being open-minded, skeptical, and willing to engage with diverse viewpoints to refine and enrich understanding. Communication skills, develop effective communication skills to convey complex ideas, findings, and insights to diverse audiences in clear, accessible, and engaging ways. This facilitates knowledge dissemination and promotes dialogue and collaboration among stakeholders. The main conclusion of this paragraph is that Agenda 21 serves as a reference for the development of public policies in Brazil, aligning economic and social needs with environmental limitations. However, the research reveals a disconnect between this guiding framework and the actual formulation of public policies at the local level in Brazilian cities. This discrepancy is attributed to political fragmentation, lack of systemic vision among public managers, and failure to enforce the City Statute. To address the worsening economic, social, and environmental challenges facing Brazil in the 21st century, effective political coordination across all levels of government is urgently needed. Public managers must commit to developing and implementing policies that align with the principles of Agenda 21 and the Cities Statute to ensure the country's readiness for a paradigm shift towards sustainability

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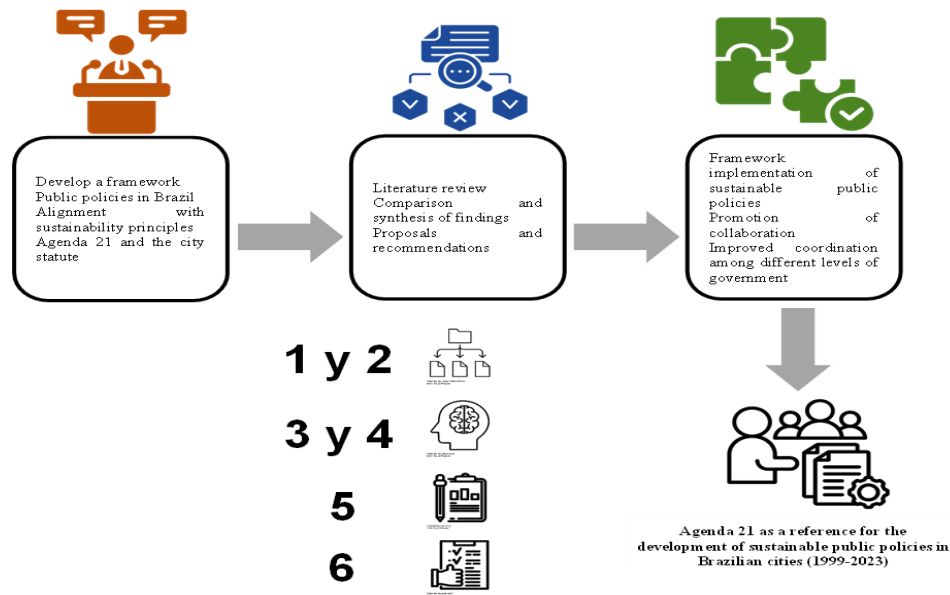
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Abstract

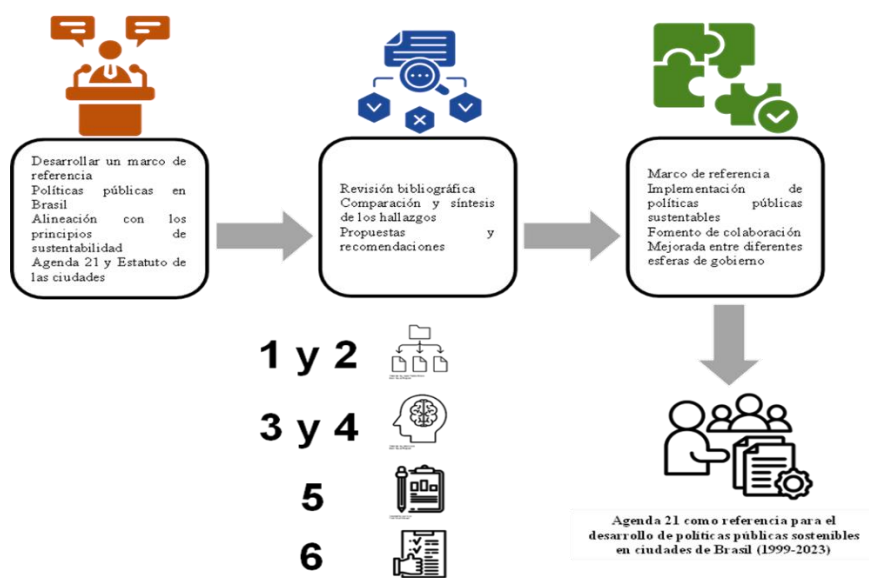
Urban planning in Brazil has faced serious challenges due to Agenda 21. Therefore, the objectives are to develop a reference framework for the effective implementation of public policy in Brazil that aligns with sustainability principles and to succinctly present the application of Agenda 21 and the Statute of Cities in the formulation and execution of public policies in Curitiba and São Paulo. The methodology involved a bibliographic review of literature related to urban sustainability, Agenda 21, and the Statute of Cities, as well as the comparison and synthesis of findings from the bibliographic review, and finally the development of proposals and general recommendations to strengthen the integration of urban sustainability into Brazilian public policies. Results showed that urban planning in Brazil during the 1980s and 1990s was neglected, partly as a rejection of the authoritarian, bureaucratic, and centralizing planning of the military regime, which has changed from 2000 to the present. Conclusions indicate that the principles outlined by Agenda 21 emerge as an option capable of reconciling economic and social needs with the intrinsic limitations of the environment.



COVID-19, Sustainable territorial development, Geography, Urban landscape, Sustainability

Resumen

La planificación urbana en Brasil ha enfrentado serios desafíos por la Agenda 21. De ahí que, los Objetivos son desarrollar un marco de referencia para la implementación efectiva de política pública en Brasil, que estén alineadas a los principios de sustentabilidad y exponer de manera sintetizada la aplicación de la Agenda 21 y el estatuto de las Ciudades en la formulación y ejecución de políticas públicas en Curitiba y Sao Paulo. Metodología, implicó la revisión bibliográfica de literatura relacionada con la sustentabilidad urbana, la Agenda 21, el Estatuto de las Ciudades así como la comparación y síntesis de hallazgos de la revisión bibliográfica y finalmente la elaboración de propuestas y recomendaciones en general para fortalecer la integración de la sustentabilidad urbana en las políticas públicas brasileñas. Resultados, la planificación urbana en Brasil durante las décadas de 1980 y 1990 fue descuidada, en parte como rechazo a la planificación autoritaria, burocrática y centralizadora del régimen military, lo cual a partir del 2000 al presente ha cambiado. Conclusiones, los principios delineados por la Agenda 21 surgen como una opción capaz de reconciliar las necesidades económicas y sociales con las limitaciones intrínsecas del medio ambiente.



COVID-19, Desarrollo territorial sustentable, Geografía, Paisaje urbano, Sustentabilidad

Introduction

In the context of Brazilian cities, the implementation of the Agenda 21 is crucial due to several reasons: I) Brazil is one of the most urbanized countries in the world, with a significant portion of its population residing in cities. Rapid urbanization brings forth challenges such as increased demand for infrastructure, services, and resources, as well as issues related to pollution, congestion, and social inequality. The Agenda 21 provides a framework for addressing these challenges through sustainable urban development strategies (Alcides et al., 2021).

II) Brazil is home to diverse ecosystems, including the Amazon rainforest, the Atlantic Forest, and the Pantanal wetlands, among others. Preserving these ecosystems is not only essential for biodiversity conservation but also for mitigating climate change and ensuring the provision of ecosystem services such as clean water, air, and food. The Agenda 21 promotes sustainable land use practices and the protection of natural resources, which are particularly relevant for Brazilian cities facing pressures from urban expansion and infrastructure development (Beck et al., 2023).

III) Inequality is a significant issue in Brazilian cities, with disparities in access to basic services, housing, education, and healthcare as in Acapulco, Mexico (Niño-Gutiérrez, 2022b). The Agenda 21 emphasizes the importance of social equity and inclusion in sustainable development efforts, advocating for participatory decision-making processes that involve marginalized communities and address their needs and priorities. By promoting inclusive policies and initiatives, Agenda 21 can contribute to building more equitable and resilient cities in Brazil (Dávalos & Romo, 2017).

IV) Adopting sustainable practices in cities can also create economic opportunities by fostering innovation, green technologies, and sustainable businesses. Brazilian cities have the potential to become hubs for sustainable urban development, attracting investment, generating employment, and driving economic growth while reducing environmental impacts. The Agenda 21 provides a framework for harnessing these opportunities and promoting green growth strategies that benefit both people and the planet (Guzmán, 2020).

V) Agenda 21: Refers to a comprehensive action plan developed by the United Nations at the Earth Summit in Rio de Janeiro in 1992. It outlines principles and guidelines for sustainable development across various sectors, including environmental protection, social equity, and economic prosperity (Perea Palomino, 2020).

Reference for the development of sustainable public policies: This highlights the role of Agenda 21 as a guiding framework or reference point for the formulation and implementation of sustainable public policies in different areas such as urban planning, transportation, waste management (Brasil, 2001), and environmental conservation. In cities of Brazil: This specifies the geographical focus of the study, emphasizing that the application of Agenda 21 principles and sustainable public policies is particularly relevant to urban areas in Brazil. Brazilian cities face unique challenges related to rapid urbanization, environmental degradation, social inequality, and economic development, making them important contexts for the implementation of sustainable initiatives (Duque, 2021).

The problem: to be solved revolves around the urgent need to address sustainability challenges in Brazilian cities. These cities are facing a multitude of interconnected issues including environmental degradation, social inequality, inadequate infrastructure, urban sprawl, and economic disparities. Rapid urbanization, population growth, and unsustainable resource consumption exacerbate these challenges, posing significant threats to the well-being of urban residents and the environment.

The central question that the agenda 21 seeks to address in Brazilian cities is how to achieve sustainable development that balances environmental protection, social equity, and economic prosperity. Specifically, it aims to find solutions to the following key issues:

Environmental degradation: Brazilian cities are grappling with pollution, deforestation, loss of biodiversity, and depletion of natural resources. The central question is how to promote environmental conservation and minimize environmental impacts while meeting the needs of urban populations (Ariza & Moreno, 2017).

Social inequality: There is a stark divide between affluent and marginalized communities in Brazilian cities, with disparities in access to basic services, housing, education, healthcare, and employment opportunities. The central question is how to promote social inclusion and ensure that all residents have equitable access to resources and opportunities for a decent quality of life (Oliveira et al., 2020).

Inadequate infrastructure: Many Brazilian cities suffer from inadequate infrastructure, including transportation systems, sanitation facilities, and housing something similar happens in other Latin American countries like Mexico where the effects of climate change are even present (Niño-Gutiérrez, 2022a). The central question is how to improve infrastructure to enhance urban mobility, public services, and living conditions while minimizing negative environmental impacts.

Urban sprawl and land use: Unplanned urban expansion and land use changes are contributing to the loss of green spaces, increased traffic congestion, and environmental degradation. The central question is how to promote compact, efficient, and sustainable urban development patterns that optimize land use, preserve natural habitats, and promote walkability and accessibility (Marques et al., 2021).

Economic development: Economic disparities and uneven distribution of wealth are persistent challenges in Brazilian cities. The central question is how to foster inclusive economic growth that generates employment, reduces poverty, and promotes prosperity for all while ensuring environmental sustainability and social equity (Parode & Bentz, 2014). In summary, the central question addressed by the agenda 21 in Brazilian cities is how to achieve sustainable development by addressing environmental, social, and economic challenges in an integrated and holistic manner. It seeks to find solutions that promote the well-being of current and future generations while preserving natural resources and protecting the environment on continent as well as on the islands of the world and even Mexico (Niño-Gutiérrez, et al., 2023a).

The sections chapter, the introduction sets the stage for the paper by providing background information on the topic, including the importance of sustainable development in Brazilian cities and the relevance of Agenda 21 as a framework for addressing urban challenges. It may include a brief overview of the current state of Brazilian cities, highlighting key issues such as environmental degradation, social inequality, and inadequate infrastructure. The introduction typically concludes with a statement of the research problem or question that the paper seeks to address, as well as an outline of the paper's objectives and structure.

The objective section explicitly states the main goals or aims of the research. It clarifies what the study seeks to achieve, such as identifying the impact of Agenda 21 on urban sustainability in Brazilian cities, assessing the effectiveness of sustainable policies, or exploring best practices for implementation. Objectives should be specific, measurable, achievable, relevant, and time-bound (SMART) to provide clear guidance for the research process even in other Latin American countries such as the southern states of Mexico (Niño-Gutiérrez et al., 2023b).

Methodology section describes the overall approach and research design used in the study. It outlines the methods and techniques employed to collect and analyze data, such as literature review, case studies, surveys, interviews, or statistical analysis. Methodological considerations such as sampling strategy, data collection procedures, and data analysis techniques are discussed in this section. The methodology should be appropriate for addressing the research objectives and generating reliable findings.

The method section provides detailed information on how the research was conducted. It includes step-by-step descriptions of data collection procedures, including sources of data, sampling methods, data collection instruments, and data analysis techniques. Any ethical considerations or limitations associated with the research process should also be addressed in this section. The method section should be sufficiently detailed to allow other researchers to replicate the study if desired.

The results section presents the findings of the study based on the data collected and analyzed. It typically includes tables, figures, charts, or narrative descriptions of key findings, organized according to the research objectives or themes. Results should be presented objectively and clearly, with appropriate

interpretation and discussion of their significance. Any unexpected or noteworthy findings should be highlighted, along with their implications for theory, practice, or policy.

The conclusion section summarizes the main findings of the study and their implications. It restates the research objectives and discusses how well they were achieved based on the results obtained. The conclusion may also offer recommendations for future research, policy implications, or practical applications based on the findings. It provides closure to the paper by reinforcing the significance of the research and highlighting its contribution to the field.

Objective of the Study: general objective, to assess the utilization of Agenda 21 as a guiding framework for the formulation and implementation of sustainable public policies in Brazilian cities from 1999 to 2023 and specific objective, analyze the adoption and integration of Agenda 21 principles into the policymaking processes of selected Brazilian cities over the specified period. This article proposes an evolutionary analysis of the debate surrounding sustainable development, highlighting how the principles established by Agenda 21 and the Statute of Cities can guide the formulation of public policies aimed at urban sustainability in Brazil. The central question of this study lies in investigating the feasibility and effectiveness of Agenda 21 as a reference for the design of public policies in the Brazilian context (Author's surname, year).

Research question, what are three central ideas about the implementation of Agenda 21 and its relevance for the near future in Brazilian cities in terms of sustainable development and quality of life?

Methodology, methodological steps: *a)* Literature review, conducting a comprehensive review of academic and technical literature related to the implementation of Agenda 21 and sustainable development in Brazilian cities. This involved accessing academic databases, specialized journals, books, and other relevant resources such as previous studies, government reports, public policy documents, and other sources addressing the topic in the Brazilian context; *b)* Analyze the collected information to identify trends, challenges, and opportunities in the implementation of Agenda 21 in Brazilian cities. *c)* Synthesize the findings obtained from the literature to identify three central ideas about the implementation of Agenda 21 and its relevance for the near future in Brazilian cities and *d)* Formulate conclusions and recommendations based on the study's findings, highlighting implications for public policy formulation and urban planning in Brazil. This integrated methodology allows for a comprehensive and multifaceted understanding of the implementation of Agenda 21 and sustainable development in Brazilian cities, as well as identifying central ideas and recommendations for the near future.

The method used in this research is qualitative, suitable when the object of study is complex, social in nature and not susceptible to quantification, according to Liebscher (1998). The qualitative approach is essential to understand the social and cultural context underlying the theme of urban sustainability. To achieve the purpose of this research, a bibliographic survey was conducted in the databases of the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA), Ministry of Cities, United Nations Environment Program and Folha de São Paulo. Furthermore, the works of renowned authors in the area of urban sustainability were explored, including Pedro Jacobi.

Data collection was carried out online, between March and August 2011. The research involved the use of keywords such as "cities", "public policies", "sustainable development" and "urban sustainability" to identify and evaluate the most relevant articles on the topic, based on the analysis of bibliographic references and summaries of relevant articles. It's possible to interpret and contextualize complex information, taking into account cultural, historical, and socioeconomic factors specific to Brazilian cities. This contextual understanding helps in identifying patterns, trends, and correlations that may not be evident through traditional analytical methods alone.

Contributions, some of the contributions include: providing an overview of how Agenda 21 influenced the development of certain sustainable public policies implemented in Brazilian cities such as Curitiba and São Paulo over a period of 24 years. Another contribution involves identifying specific challenges encountered in selected Brazilian cities where the implementation of public policies based on the principles of Agenda 21 holds international significance and it provides practical recommendations to enhance the effectiveness of implementing sustainable policies in Brazilian cities, based on lessons learned from the implementation experience of Agenda 21.

Results

At the end of the 20th century, sustainability assumed a preponderant role in discussions about the current economic development model, considering its social and environmental impacts, both regionally and globally. The concept of sustainable development emerged as a response to the emerging ecological crisis, giving rise to two schools of thought for the formulation and debate of new development proposals. The report "The Limits of Growth", published by the Club of Rome in 1972, warned about the limits of humanity's growth in the context of the economic model then practiced, pointing out the need to freeze global population growth and of industrial capital. The document emphasized the scarcity of natural resources, reflecting a Malthusian approach (IBAMA, 2009).

The Stockholm Conference, in 1972, marked itself as the first global conference focused on the environment, representing a significant international political milestone. This conference gave rise to 25 fundamental principles that guided international actions, recognizing the importance of man as an agent for transforming the environment, emphasizing the need for balance between social progress, wealth creation, scientific advances and environmental preservation (Passos, 2009; IBAMA, 2009).

The Brundtland Report, titled "Our Common Future" and prepared by the UN Commission on Environment and Development in 1987, addressed social issues related to land use, housing, access to water, social, educational and health services. It also dealt with the management of urban growth (Barbosa, 2009).

Twenty years after the Stockholm Conference, Eco 92 took place in Rio de Janeiro, bringing together heads of state to address development inequalities between nations and environmental preservation. This event introduced the concept of sustainable development, a model that integrates economic growth, environmental preservation and social inclusion. Among the international agreements resulting from Eco 92, the Climate Convention, Agenda 21, Biodiversity Convention and the Rio Declaration stand out, influencing environmental regulations in several countries (Folha Online, 2002).

Rio + 10, held in Johannesburg ten years after Eco 92, reaffirmed previous commitments and the challenges faced by nations, committing to sustainable development and democratic multilateralism. This conference highlighted the importance of joint actions to achieve the proposed objectives (Public Management Quality Committee, 2002).

The concept of sustainable development, according to the Brundtland Report (1991), aims to meet current needs without compromising the ability of future generations to meet their own needs, maintaining an adequate level of social, economic, human and cultural development, in addition to ensuring the rational use of natural resources and the preservation of habitats and species.

To make commitments made in international forums viable, the State plays a crucial role in supporting sustainable development through economic and legal instruments, regulation, management of social contracts and promotion of policies that induce planned strategies (Bird, 1997; Bursztyn, 2001).

Sustainable development, as a driver of public policies, requires a national development plan and the consideration of a wide range of social actors and interests, which can represent a challenge for public policies that seek the intersection between economic, social and social development. environmental preservation (Bezerra & Bursztyn, 2000).

Urban sustainability demands a reassessment of development models and social, environmental and economic relations in cities. This approach aims to maintain environmental health, reduce social inequalities, provide a healthy built environment and establish political pacts and citizenship actions to face present and future challenges (Silva, 2003).

In the context of public policies, they are understood as government action programs that coordinate state means and private activities to achieve objectives relevant to society (Bucci, 2002; Muller & Surel, 1998). Cities, in turn, play a fundamental role in the construction of public policies that cover the social, environmental and economic pillars of sustainability.

From the 1960s onwards, Brazil witnessed an intense urbanization process, whose lack of adequate planning resulted in a series of socio-environmental and economic problems. Rapid urban growth has generated issues such as more frequent floods, inadequate disposal of solid waste, irregular occupation of environmentally sensitive areas, such as slopes and floodable areas, in addition to precarious settlements characterized by social exclusion and unequal access to public investments (Romualdo & Souza, 2009; Costa & Braga, 2004).

Jacobi (2006) highlights a continuous worsening of these problems in large Brazilian cities. This scenario reflects a model of urban occupation that amplifies socioeconomic disparities, highlighting the ineffectiveness of public policies in identifying, correcting and proposing measures to organize urban space and improve the quality of life of all citizens.

The environmental crisis resulting from these inadequate administrative practices, together with the delay in implementing public policies, is associated with crucial issues.

Reduction of green areas, soil sealing and increase in areas susceptible to flooding negatively impact the urban structure and generate significant environmental, social and economic consequences (Jacobi, 2006).

Furthermore, the lack of measures to control air pollution, expand the public transport system and improve the sewage network contributes to the contamination of urban water sources and rivers, in addition to the exhaustion of conventional waste disposal methods, resulting in problems public health and worsening the precarious housing conditions of part of the population, often in risk areas (Jacobi, 2006).

Brazilian urban planning, especially in the 1980s and 1990s, was neglected, partly as a rejection of the authoritarian, bureaucratic and centralizing planning practiced during the military regime. This stance resulted in serious urban problems. When urban growth is not accompanied by equitable investments in infrastructure and democratic access to urban services, socio-spatial inequalities are accentuated (Guerra & Cunha, 2006). In this context, cities and metropolitan regions reveal significant disparities in income distribution, as confirmed by Jacobi (2006). Thus, reducing poverty and combating urban violence require a coordinated approach through effective public policies that meet these needs, reinforcing the need for intersectoral action at the municipal and regional levels.

Sustainable urban mobility: Expansion of public transportation: São Paulo can implement policies to expand and improve its public transportation system, including the extension of metro lines, integration of different modes of transportation (metro, bus, light rail, bicycle), and creation of exclusive bus lanes (Figure 1).

Box 1



Figure 1
Bus in Ribeirão, Brazil

Source: Taken by the authors

Incentives for active mobility: Programs and policies can be established to promote cycling and walking, such as creating safe bike lanes, implementing bike-sharing systems, and pedestrianizing certain urban areas; traffic management and vehicle restrictions, traffic management policies can help reduce congestion and emissions of polluting gases by implementing urban tolls, vehicle circulation restrictions based on the day of the week or license plate, and promoting shared transportation systems.

Integrated waste management: Recycling and source separation: São Paulo can implement more effective recycling programs, including source separation and differential waste collection, as well as creating recycling centers and clean points for the proper disposal of recyclable materials; **reduction of food waste:** Public policies can encourage the reduction of food waste in the city through awareness campaigns, support for food donation initiatives, and promotion of more conscious and sustainable consumption practices and treatment and proper disposal of waste: São Paulo can work on improving the infrastructure for solid waste treatment, including the construction of composting plants and organic waste treatment facilities, as well as promoting environmentally safe disposal practices (Figure 2).

Box 2



Figure 2

Waste management in Ribeirao, Brazil

Source: Taken by the authors

Conservation and recovery of green spaces: Expansion of green areas and urban parks: São Paulo can develop policies to expand and improve accessibility to green areas and urban parks, creating new green spaces and enhancing the infrastructure of existing ones to promote outdoor recreation and urban biodiversity; **restoration of degraded areas:** Public policies can drive the restoration of degraded areas in the city, such as rivers and watercourses, through the implementation of renaturalization and reforestation projects, as well as the creation of biological corridors to connect fragmented habitats and promotion of urban agriculture and biodiversity: São Paulo can promote urban agriculture and biodiversity conservation in the city by encouraging community gardens, protecting areas of ecological value, and creating policies for the conservation of native fauna and flora.

Public policies and the status of cities, the search for sustainability in Brazilian cities, as discussed in chapter 2, represents a significant challenge in the context of the formulation and implementation of public policies. The effort to make cities sustainable requires the adoption of public policies that rethink the development model, promoting an interrelationship between social justice, quality of life, environmental balance and economic growth (Silva, T., 2003; Jacobi, 2006).

In this context, municipal policies face the challenge of integrating sustainability as a guiding guideline, aligned with the principles of Agenda 21, which advocates a vital connection between social equity, improved quality of life and development in line with the support capacity and community participation (Jacobi, 2006).

The role of the legislative branch is crucial in formulating public policies, while the executive branch assumes responsibility for their implementation. In case of omissions by the Public Power in the implementation of policies aimed at sustainable development, the judiciary has the role of demanding, through legal actions, that the executive complies with such measures.

Law Number 10 257, known as the Cities Statute, enacted on July 10, 2001, establishes the right of citizens to sustainable cities, covering urban land, housing, environmental sanitation, infrastructure, transport, public services, work and leisure, for current and future generations. Furthermore, it obliges municipalities to develop public policies that meet this right (Jacobi, 2006).

Silva, T. (2003, p. 8) highlights the Cities Statute as legislation that enshrines the guidelines of urban policy, guaranteeing the right to sustainable cities. This right covers several dimensions, from housing conditions to environmental preservation, representing a collective right to dignified urban life and access to a balanced environment and quality public services.

The statute of cities and Agenda 21, "Agenda 21", a document approved at Rio 92, outlines an action plan to be adopted globally, nationally and locally, aiming to establish guidelines for a change in the pattern of development in the 21st century. This document aspires to promote a new development model that harmonizes environmental protection, social justice and economic development (Silva, M., 2003).

Silva, M. (2003, p. 1) defines Agenda 21 as a participatory planning process that assesses the current situation and plans the future in a sustainable way, involving the whole of society in the discussion of the main problems and in the formulation of partnerships for the short-, medium- and long-term solution. This process requires an integrated approach to the economic, social, environmental and political-institutional dimensions, generating social insertion and opportunities to define priorities in public policies.

Chapter 28 of the global Agenda 21 proposes that each country develop a local Agenda 21, "based on economic, social and environmental development, establishing local environmental policies and supporting the implementation of national environmental policies" (Silva, 2003, p. 3).

The Cities Statute, aligned with the principles of Agenda 21, defends the implementation of local agendas to change unsustainable development patterns. The importance of the local level in implementing sustainable public policies is recognized.

According to Silva, T. (2003), for Brazilian cities to adapt to the ideals of Agenda 21 and the Statute of Cities, transformations are necessary in production and consumption patterns, which have degraded natural resources and affected the quality of life urban.

Strategic urban sustainability proposals for Brazilian cities include land use regulation, strengthening democratic management, changes in the production and consumption model, generation of sustainable jobs, application of economic mechanisms for the management of natural resources, among others.

Brazilian society, predominantly urban, plays and will play an increasingly important role in the formulation of public policies, seeking a balance between social, economic and environmental dimensions. The objective is to guarantee decent living conditions for everyone, promoting socioeconomic and environmental balance (*Ibidem*, 2003).

The alignment of the principles of Agenda 21 and the Statute of Cities, added to extensive research on Brazilian urban problems, becomes essential for the three powers (Executive, Legislative and Judiciary) in the elaboration, execution and supervision of sustainable public policies that address urban spaces and promote economic, social and environmental balance (Figure 3).

Box 3



Figure 3

Geographical situation of Brazil.

Source: IBGE, 2016.

The Agenda 21 in São Paulo and Curitiba

Efficient and sustainable public transportation: São Paulo, Implementation of measures to improve the quality and efficiency of public transportation, such as expanding the metro and suburban train network, optimizing bus routes, and promoting non-motorized transportation systems like bicycles and electric scooters.

Curitiba: Continuation and improvement of the innovative public transportation system known as "Bus Rapid Transit" (BRT), with the expansion of routes and integration with other modes of transportation, as well as promoting bicycle use by expanding the network of bike lanes and public bike stations.

Integrated waste management and promotion of recycling:

São Paulo: Implementation of waste separation programs at the source and expansion of the recycling point network, as well as promoting the circular economy through material reuse and waste reduction (Ferraresi de Araujo & Niño-Castillo, 2021).

Curitiba: Continuation and strengthening of the successful selective waste collection program, with active participation from the population in separating recyclable materials and expanding recycling infrastructure in the city.

Development of green spaces and environmental recovery: São Paulo, creation and restoration of urban parks and green areas, as well as protection of remnants of native vegetation, with the aim of improving air quality, providing recreation spaces, and promoting biodiversity in the city (Da Silva et al., 2019).

Curitiba: Continuation of the green area preservation and expansion program, including linear parks and urban forests, with the restoration of degraded areas and promotion of native fauna and flora conservation.

These central ideas reflect some of the key aspects of Agenda 21 implementation in the cities of São Paulo and Curitiba, highlighting key measures to promote sustainable development, improve the quality of life for residents, and protect the environment.

Some findings are related to: **Strengthening sustainable transportation infrastructure:** Implementing additional measures to improve and expand sustainable transportation infrastructure, such as expanding exclusive bus lane networks, building more bike lanes, and integrating public transportation systems to facilitate population mobility.

Promotion of active citizen participation: Developing programs and strategies to encourage active citizen participation in decision-making related to urban planning and environmental management, including awareness campaigns, digital participation platforms, and the creation of advisory councils representing various sectors of society (Scarpeline de Castro et al., 2019).

Investment in waste management technologies and programs: Allocating economic and technical resources to improve solid waste management systems, through the implementation of innovative recycling and waste treatment technologies, formalization of recycling cooperatives, and implementation of educational programs promoting responsible consumption practices and waste separation at the source (Oh & Hettiarachchi, 2020).

Agenda 21 and the near future, transition towards sustainable mobility: Expansion of public transportation: Implementing policies to expand and improve public transportation, including expanding metro networks, integrating different modes of transportation, and promoting electric transportation systems.

Promotion of active mobility: Encouraging the use of bicycles and walking by creating safe infrastructure such as bike lanes and pedestrian trails, as well as implementing bike-sharing systems.

Reduction of vehicle emissions: Implementing measures to reduce vehicle emissions, such as promoting electric vehicles, introducing stricter emission standards, and adopting cleaner transportation technologies.

Integrated waste management: Promotion of recycling and circular economy: Implementing policies to encourage recycling and material reuse, including source separation, establishment of recycling centers, and incentivizing the recycling industry (Almeida et al., 2023).

Reduction of food waste: Developing strategies to reduce food waste throughout the supply chain, including awareness campaigns, support for food banks, and surplus redistribution programs (Vaz Sales et al., 2023).

Improvement of waste management: Modernizing waste management infrastructure, including the construction of treatment and composting plants, as well as implementing innovative technologies for waste handling (Koetz et al., 2023).

Development of green and resilient spaces: Expansion of urban green areas: Promoting the creation and conservation of parks and green areas within cities to improve the quality of life for inhabitants and foster urban biodiversity (Delgado da Silva et al., 2024).

Adaptation to climate change: Developing strategies for climate change adaptation, including the creation of resilient infrastructures, disaster risk management, and the promotion of urban agriculture and green spaces as mitigation measures (Araújo et al., 2024).

Construction of more sustainable cities: Integrating sustainability principles into urban development, including land use planning, promoting energy efficiency in buildings, and sustainable water management (Stefani, et al., 2024).

These core ideas reflect the importance of addressing key issues such as sustainable mobility, integrated waste management, and the development of green spaces to ensure a more sustainable future in Brazilian cities, in line with the principles of Agenda 21. Some recommendations for the effective implementation of Agenda 21 in Latin American cities: *i) Engage the local community:* Foster active participation of the community in planning, implementing, and monitoring policies related to Agenda 21 in island areas (Niño-Gutiérrez et al., 2023a).

This can be achieved through creating spaces for dialogue and citizen consultation, as well as promoting environmental education and awareness about the importance of sustainable development; *ii*) Establish clear goals and objectives: Define concrete and achievable goals and objectives to guide the implementation of Agenda 21 in each city. These goals should be Specific, Measurable, Attainable, Relevant, and Time-bound (SMART), and should reflect the local needs and priorities in terms of sustainable development.

iii) Promote intersectoral integration: Encourage collaboration and coordination among different sectors and stakeholders, including local governments, civil society, the private sector, and academia. This can facilitate the implementation of comprehensive and multisectoral approaches to effectively address environmental, social, and economic challenges;

iv) Adopt sustainable urban planning approaches: Incorporate principles of sustainable urban planning into urban design and development processes, such as promoting urban densification, protecting green areas, and creating accessible and safe public spaces. Additionally, it is important to consider the integration of green and blue infrastructure in urban design to enhance resilience to climate change.

v) Implement sustainable mobility policies: Prioritize the development of efficient, safe, and accessible public transportation systems, as well as encourage the use of non-motorized modes of transportation, such as walking and cycling. Promoting sustainable mobility can help reduce traffic congestion, improve air quality, and encourage a more active and healthier lifestyle and *vi*) Strengthen waste and natural resource management: Implement policies and programs to improve solid waste management, promote recycling and material reuse, as well as encourage sustainable management of natural resources, such as water and energy. This can help reduce environmental pollution, minimize resource waste, and promote a more sustainable circular economy.

Conclusions

The core of this article was to answer the question: does Agenda 21 serve as a reference for the elaboration of public policies in Brazil?

The literature review carried out affirmatively corroborates this issue, considering the exhaustion of the current model of production and development that results in global socio-environmental impacts, such as the greenhouse effect, the destruction of the ozone layer, the devastation of native forests, desertification and pockets of poverty in different regions of the world. At a regional level, there are problems such as violence, construction in risk areas, inadequate transport systems, deficiencies in sanitation, education and health, as well as environmental phenomena such as acid rain, floods, thermal inversions and heat islands (Niño-Gutiérrez, 2023).

In this context, the principles outlined by agenda 21 emerge as an alternative capable of reconciling economic and social needs with the intrinsic limitations of the environment. However, the definition of public policies as government action programs aimed at coordinating state resources and private activities to achieve socially relevant and politically determined objectives reveals a misalignment. It can be seen, based on the theoretical references presented in chapter 2 of this study, that the majority of public policies at the local level in Brazilian cities are not guided by either Agenda 21 or the Statute of Cities.

This reality is justified, in large part, by the lack of political articulation between the ministerial, federal, state and municipal spheres, by the absence of a systemic vision of public managers in relation to the main urban problems in Brazil and by the failure of the judiciary to do comply with the City Statute, despite its legal force. For Brazil to adapt to the inevitable transformations of the 21st century, marked by worsening economic, social and environmental scenarios on a global scale, the need for effective political articulation in the three spheres of power becomes urgent.

It is essential that public managers are committed to the development and execution of public policies aligned with the principles of Agenda 21 and in line with the Cities Statute. Only in this way will Brazilian cities and the country as a whole be prepared for the change in development paradigm towards sustainability and even other Latin American countries such as Mexico (Niño-Gutiérrez, 2022c).

Recommendations

Promotion of sustainable transportation infrastructure: Brazil can prioritize investment in sustainable transportation infrastructure in its cities, drawing from successful policies implemented in São Paulo and Curitiba. This would entail expanding efficient public transportation systems, constructing safe bike lanes, and implementing exclusive bus lanes. By enhancing the accessibility and efficiency of public transportation, car dependency can be reduced, leading to a decrease in greenhouse gas emissions.

Strengthening citizen participation and inclusive governance: Actively involving the community in decision-making related to urban development and environmental protection is crucial. Brazilian cities can implement effective mechanisms to promote citizen participation, such as public hearings, advisory councils, and digital participation platforms.

Additionally, fostering collaboration among local government, civil society, and the private sector will ensure more inclusive and transparent governance. Improvement of waste management: Brazil can address persistent challenges in solid waste management by adopting comprehensive and sustainable strategies. This would involve investing in modern recycling and waste treatment technologies, promoting source separation of waste, and supporting community recycling initiatives. Moreover, it is essential to implement environmental education campaigns to raise awareness about the importance of waste reduction, reuse, and recycling, thereby contributing to the creation of cleaner and more sustainable cities.

According to the exposition in this chapter, the interrelation between sustainable territorial development and the transformation of urban landscapes in the post-COVID-19 era is explored. The impact of the pandemic on urban planning and development is examined in detail, emphasizing the urgency of adopting resilient and adaptable strategies to address the challenges presented by this crisis. Regarding sustainable public policies in Brazil, their relevance and effectiveness in the current context are analyzed, identifying areas for improvement and opportunities to strengthen their implementation. The paper particularly highlights the mobility situation in transportation in cities like Curitiba and Sao Paulo, showcasing innovative and successful models that have been implemented, as well as the challenges that still persist in this area. The importance of promoting efficient, accessible, and sustainable public transportation systems to improve the quality of life of residents and reduce environmental impact is emphasized. As for ideas to be implemented in the near future, it is suggested: a) implement integrated urban mobility policies that promote the use of public and non-motorized transportation, encouraging a reduction in the use of private cars; b) encourage investment in green infrastructure and clean technologies in public transportation, such as electric buses and renewable energy systems and c) foster citizen participation in decision-making related to urban planning and transportation, ensuring greater inclusion and representation of different sectors of society in the search for sustainable solutions for cities.

Declarations

Conflict of interest

The authors declare no interest conflict. They have no known competing financial interests or personal relationships that could have appeared to influence in this chapter.

Author contribution

Ferraresi-De Araujo, Geraldo Jose: Conducted primary research, collected data, and drafted sections related to sustainable public policies in cities of Brazil.

Niño-Castillo, Isaías Naú: Focused the preliminary draft review was conducted, gathering relevant literature, and synthesizing findings.

Abdel-Wahabsherif, Sherif Ibrahim: Contributed with the English writing of the paper.

Availability of data and materials

Availability of data: The collected data as well as supplementary materials accompanying the publication of this research are accessible to other users. Through request to the authors.

Availability of materials: The authors specify that the materials are freely available for other users to use without any restrictions or conditions associated with access to them. This means that the materials, such as data sets, experimental protocols, software code, or other resources, can be accessed and utilized by anyone interested in the research without requiring permission or facing any limitations. This commitment to open access promotes transparency, reproducibility, and collaboration in research, allowing others to verify findings, replicate experiments, or build upon the work without barriers.

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Abbreviations

BRT: Bus Rapid Transit

IBAMA: Brazilian Institute of the Environment and Renewable Natural Resources

IGBE: Brazilian Institute of Geography and Statistics

SMART: Specific, Measurable, Attainable, Relevant, and Time-bound

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