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Planejamento Urbano Sustentável: Estratégias e benefícios ambientais

Sustainable Urban Planning: Strategies and Environmental Benefits

Planificación Urbana Sostenible: Estrategias y Beneficios Ambientales

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RESUMO
Tornar as cidades e os assentamentos humanos inclusivos, seguros, resilientes e sustentáveis é um dos objetivos estabelecidos na Agenda 2030 pela ONU (Organização das Nações Unidas) e um compromisso assumido por todos os países membros, incluindo o Brasil (ORGANIZAÇÃO DAS NAÇÕES UNIDAS, 2015). Nesse contexto, políticas e ações de planejamento urbano que abordam questões ambientais são fundamentais para alcançar as metas estabelecidas. Este estudo tem como objetivo geral investigar quais políticas e ações de planejamento urbano colaboram para a sustentabilidade ambiental nas grandes cidades. Os objetivos específicos são determinar os principais desafios na incorporação de práticas sustentáveis no planejamento urbano e relacionar os benefícios potenciais da implementação de infraestruturas verdes nas zonas urbanas. Trata-se de uma revisão bibliográfica que aborda conceitos, características, classificações e definições constantes das normas pertinentes sobre o assunto. Entre os resultados, foi possível definir o conceito de Planejamento Urbano Sustentável e identificar as principais estratégias de Sustentabilidade Urbana. Concluiu-se que, para alcançar a sustentabilidade no planejamento urbano, é essencial adotar uma abordagem integrada e participativa, garantindo que as políticas beneficiem todos os segmentos da população e contribuam para o desenvolvimento sustentável das cidades.

PALAVRAS-CHAVE: Planejamento. Meio Ambiente. Sustentabilidade. Políticas Sustentáveis.

SUMMARY
Making cities and human settlements inclusive, safe, resilient, and sustainable is one of the objectives established in the 2030 Agenda by the UN (United Nations) and a commitment made by all member countries, including Brazil (UNITED NATIONS, 2015). In this context, urban planning policies and actions addressing environmental issues are fundamental to achieving the established goals. This study aims to investigate which urban planning policies and actions contribute to environmental sustainability in large cities. The specific objectives are to determine the main challenges in incorporating sustainable practices into urban planning and to relate the potential benefits of implementing green infrastructure in urban areas. This is a literature review that addresses concepts, characteristics, classifications, and definitions according to relevant standards on the subject. Among the results, it was possible to define the concept of Sustainable Urban Planning and identify the main strategies for Urban Sustainability. It was concluded that to achieve sustainability in urban planning, it is essential to adopt an integrated and participatory approach, ensuring that policies benefit all segments of the population and contribute to the sustainable development of cities.

KEYWORDS: *Planning. Environment. Sustainability. Sustainable Policies.*

RESUMEN
Hacer que las ciudades y los asentamientos humanos sean inclusivos, seguros, resilientes y sostenibles es uno de los objetivos establecidos en la Agenda 2030 por la ONU (Organización de las Naciones Unidas) y un compromiso asumido por todos los países miembros, incluido Brasil (NACIONES UNIDAS, 2015). En este contexto, las políticas y acciones de planificación urbana que abordan cuestiones ambientales son fundamentales para alcanzar los objetivos establecidos. Este estudio tiene como objetivo investigar qué políticas y acciones de planificación urbana contribuyen a la sostenibilidad ambiental en las grandes ciudades. Los objetivos específicos son determinar los principales desafíos en la incorporación de prácticas sostenibles en la planificación urbana y relacionar los beneficios potenciales de la implementación de infraestructuras verdes en las áreas urbanas. Se trata de una revisión bibliográfica que aborda conceptos, características, clasificaciones y definiciones según las normas pertinentes sobre el tema. Entre los resultados, fue posible definir el concepto de Planificación Urbana Sostenible e identificar las principales estrategias de Sostenibilidad Urbana. Se concluyó que, para lograr la sostenibilidad en la planificación urbana, es esencial adoptar un enfoque integrado y participativo, asegurando que las políticas beneficien a todos los segmentos de la población y contribuyan al desarrollo sostenible de las ciudades.

PALABRAS CLAVE: Planificación. Medio Ambiente. Sostenibilidad. Políticas Sostenibles.

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1. INTRODUCTION

Making cities and human settlements inclusive, safe, resilient, and sustainable is one of the goals set in the 2030 Agenda by the United Nations (UNITED NATIONS, 2015), and it is a commitment made by all member countries, including Brazil. In this context, urban planning policies and actions that address environmental issues that address environmental issues are fundamental to achieving the intended goals. However, there are many challenges to be faced, as pointed out by the civil society shadow report (2023). This is because, under Goal 11 (Sustainable Cities and Communities), nine out of ten established targets are regressing, while the last one (Target 11.c) lacks data.

The existence of indicators for evaluation is one of the challenges presented in the report. Of the indicators available on the SDG dashboard for Brazil, there is no data for five of the goals under this objective, and some are outdated. For example, Table 1 shows the proportion of the urban population living in precarious settlements in 2010: is shown in Table 1:

Table 1 - Proportion of the urban population living in precarious settlements, informal settlements, or inadequate housing - 2010

UF	%
Brazil	41.4%
Pará	85.2%

Source: IPEA. Accessed on 15/04/2023. Available at:

The way urban planning policies address environmental issues can be problematic if they do not adequately consider the social, economic, and political aspects involved. According to Soares et al. (2017), poorly planned policies can result in environmental inequalities, where certain urban areas or communities have disproportionate access to natural resources and green spaces, while others are neglected. This imbalance can increase socioeconomic disparities and negatively affect the quality of life of certain population groups (SILVA; ALMEIDA, 2018). Furthermore, Ferreira (2015) highlights that excluding social and economic considerations in urban planning can lead to the marginalization of vulnerable communities, exacerbating problems such as poverty and social exclusion.

Moreover, De Sousa Silva et al. (2018) point out that policies promoting green spaces or urban revitalization may lead to gentrification, driving up real estate prices and displacing low-income residents to areas with less access to services and adequate infrastructure. Implementing effective environmental policies often requires significant investments in green infrastructure and sustainable technologies, which can be a major challenge for municipalities with limited financial resources, resulting in delays or partial implementations of the policies.

The topic is important for society as it can improve Urban Quality of Life through effective urban planning policies that promote the sustainable use of natural resources and the creation of green spaces that directly contribute to improving the quality of life of urban inhabitants. This translates into healthier cities with cleaner air, accessible leisure areas, and a greater sense of well-being. Consequently, it strengthens cities' resilience to challenges such as climate change, pollution, and resource scarcity, reducing the adverse impacts of extreme events.

For the academic community, studying how urban planning policies address environmental issues drives research and the development of new sustainable technologies and practices, providing valuable insights into the effectiveness of existing approaches and

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contributing to cities' engagement with global sustainable development goals, such as the UN's Sustainable Development Goals (SDGs). This is crucial for achieving a successful trajectory towards more sustainable cities globally.

Therefore, investigating how urban planning policies address environmental issues goes beyond improving immediate urban conditions. The research contributes to a more holistic vision of urban development, promoting healthier, resilient, and equitable societies while fostering innovation and progress towards a sustainable future.

2. OBJECTIVES

2.1 GENERAL OBJECTIVE

To investigate which urban planning policies and actions that address environmental issues contribute to environmental sustainability in large cities.

2.2 SPECIFIC OBJECTIVES

Determining the main challenges in incorporating sustainable practices into urban planning.

To relate the potential benefits of implementing green infrastructures in urban areas.

3. METHODOLOGY

This study was conducted through a bibliographic research focused on fundamental information related to the subject, as this is the most appropriate approach to achieve the established objectives. According to Chiara et al. (2008), "bibliographic research is conducted with the purpose of gathering pre-existing knowledge on theories with the aim of analyzing, producing, or explaining an object under investigation." In this context, it seeks to analyze the main theories on a topic and can be conducted for various purposes.

The knowledge gathered in this study was obtained from various sources of information, such as books, journals, scientific articles, and others. In addition, relevant legislation on water use and its purposes was consulted, as well as the technical standards governing the subject. The theoretical framework resulting from the compilation of all consulted sources aims to support the study presented and reinforce the importance of concern with water and its various uses.

The collected data were subjected to critical analysis and discussed, considering not only the author's opinion but also the literary data used as references for the study.

4. THEORETICAL FRAMEWORK

Urban planning is a collective, progressive, and interrelated process, as described by Saboya (2019), involving multiple interconnected decisions to structurally address the problems in city development. This process is fundamental to ensure that cities grow in an orderly, sustainable, and inclusive manner. In the Brazilian context, where social and economic inequalities are pronounced, urban planning plays an essential role in mitigating these disparities.

Bostan (2020) defines urban planning as a multidisciplinary process that seeks sustainable development and the integration of habitable spaces at various scales, considering

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legal, economic, and political dimensions for holistic urban improvement. In Brazil, this approach is especially relevant due to the complexity of urban issues, which range from the lack of adequate housing to the need for basic infrastructure. The author emphasizes the importance of integrated public policies that address the diversity of Brazilian urban regions and promote equitable development.

Wang (2020) highlights that the goal of urban planning is to create safe and accessible habitable spaces, using a data-driven approach that employs large amounts of information to identify spatial indicators and guide decision-making processes. This perspective is particularly relevant in Brazil, where data collection and analysis can help identify priority areas for urban interventions. Geoprocessing tools and spatial analyses can provide valuable insights for the development of more effective policies.

According to Kuhlman and Farrington (2010), sustainability should be understood as the pursuit of balance between human needs and the regenerative capacity of natural systems, meaning the ability to meet current needs without compromising the ability of future generations to meet their own needs. This approach includes environmental, social, and economic aspects, emphasizing the harmonious coexistence between the Earth's biosphere and human society (KUHLMAN & FARRINGTON, 2010). In Brazil, this perspective is essential to address challenges such as deforestation, urban pollution, and climate change.

According to Alipour and Hussein (2023), Urban planning strategies that focus on sustainability include the integration of resilience, community participation, and innovative design approaches aimed at addressing environmental impacts and enhancing the sustainability of the built environment in large cities. In the Brazilian context, community participation is essential to ensure that urban solutions are inclusive and meet the needs of all population segments. Participatory projects can help create a sense of belonging and responsibility among citizens, promoting long-term sustainability.

Urban Digital Twin technology contributes to sustainable urban planning by offering predictive models for city development. Competence-oriented planning and the adoption of digital innovations are fundamental to achieving sustainability goals in large cities (BARRESI, 2023). In Brazil, where many cities face infrastructure and urban management challenges, the adoption of these technologies can significantly improve the efficiency of planning and policy implementation processes.

4.1 Application of Theories in the Brazilian Context

In Brazil, urban planning faces unique challenges due to significant social and economic inequality, as well as regional disparities. According to Fernandes (2018), Brazilian cities require policies that consider local specificities, such as the presence of favelas and informal settlements, which are distinct realities from other regions of the world. These areas require specific interventions that promote land regularization and social inclusion.

Monteiro (2020) argues that urban planning in Brazil must incorporate urban resilience strategies to address frequent natural disasters such as floods and landslides. These strategies include the creation of green infrastructures and the implementation of early warning systems, which are essential for protecting vulnerable populations.

The adoption of innovative technologies such as urban digital twins—a digital representation of an environment or physical asset (GALVÃO, 2023)—can transform urban planning in Brazil. According to Souza and Almeida (2021), these technologies enable detailed simulations that help forecast problems and develop more effective solutions. However,

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implementing these technologies requires significant investments in infrastructure and technical capacity.

4.2 Main Challenges for the Incorporation of Sustainable Practices in Urban Planning

The challenges of integrating sustainable practices into urban planning are diverse and broad. Socioeconomic issues, trends of depopulation, and the need for active engagement of citizens and stakeholders in implementing effective Integrated Sustainable Urban Development (ISUD) strategies are highlighted by Medeiros and Van der Zwet (2020). The incorporation of sustainable practices into urban planning faces significant obstacles. Berawi et al. (2023) mention the persistence of utilitarian approaches to resource management, prioritization of short-term policies, resistance to systemic thinking, and deficiencies in municipal capacity as crucial challenges.

Furthermore, Spiliotopoulou and Roseland (2022) point to barriers such as insufficient knowledge about sustainable construction, high material costs, lack of training, and unfavorable government policies, which hinder the implementation of sustainable practices in residential and commercial buildings. According to Shaker et al. (2022), the complexity of urban sustainability processes requires a shift towards a holistic assessment of policy impacts, non-hierarchical decision-making processes, and the use of local knowledge for effective decision-making. Sroka and Lorencová (2022) argue that greater efforts are needed to overcome the barriers and disadvantages that hinder the transition to an integrated sustainable urban development approach, prioritizing inclusivity and the sustainability of cities.

Public awareness and government support are essential to overcoming financial and technical obstacles. For example, the use of technologies such as Urban Digital Twins can provide predictive insights for sustainable development, but their implementation requires significant initial investments (BARRESI, 2023).

4.3 Benefits of Implementing Green Infrastructures in Urban Areas

The implementation of green infrastructures in urban areas offers considerable benefits. According to the Environmental Finance Center at the University of North Carolina, "green infrastructure can provide less expensive and more effective approaches to managing stormwater runoff" (UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL, 2023). In this way, it can contribute to sustainable development, climate regulation, water management, and ecosystem services, improving the economic, social, and environmental aspects of cities. Additionally, it aids in climate change adaptation by reducing the negative effects of urban heat islands and floods, promoting rational space management, and enhancing residential and recreational areas.

On the other hand, green infrastructure interventions can significantly improve urban residents' affective perceptions of their local environments, promoting positive feelings and reducing discomfort, especially in economically disadvantaged areas (JANISZEK & KRZYSZTOFIK, 2023).

Urban planning plays a relevant role in advancing environmental sustainability by guiding spatial patterns in cities and preserving biodiversity (ENOGUANBHOR, 2023). According to Khaleefah and Alwan (2022), urban planning is essential for promoting environmental sustainability, focusing on creating green zones to combat environmental degradation, establishing a balance between the environment, economy, and social values, and supporting the development of sustainable cities. In summary, green infrastructure contributes to creating

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more livable, healthy, and resilient cities, providing ecological, socio-cultural, and economic benefits.

4.4 Practical Examples of Cities that Have Successfully Implemented Sustainable Urban Planning Policies

Copenhagen, Denmark: Known for its extensive bike paths and policies that encourage the use of bicycles, as well as investments in green infrastructure like urban parks and green roofs. According to Gehl (2010), the city has significantly reduced carbon emissions by promoting cycling, which is currently one of the main modes of transportation for its inhabitants. Additionally, initiatives such as the "Copenhagen Climate Plan" aim to make the city a carbon-neutral capital by 2025.

Curitiba, Brazil: Recognized for its efficient public transportation system and recycling projects that involve the community. Curitiba is often cited as an example of innovation in sustainable urban planning in Latin America. According to Rabinovitch (1992), the implementation of the express bus system, known as BRT (Bus Rapid Transit), was pioneering and has served as a model for many other cities around the world. Furthermore, recycling programs that directly involve residents, such as the "Green Exchange," have contributed to environmental awareness and improved waste management.

Singapore: Famous for its urban planning that integrates nature into urban areas with vertical gardens and interconnected parks that promote biodiversity and quality of life. Wong (2013) highlights that Singapore implemented a "City in a Garden" approach, where green areas are integrated throughout the urban infrastructure. Notable examples include the "Gardens by the Bay" and buildings with vertical gardens that not only beautify the city but also contribute to thermal regulation and improved air quality.

4.5 Current Policies Related to Sustainable Urban Planning in Brazil

In Brazil, several policies and programs have been implemented to promote more inclusive, safe, resilient, and sustainable urban development. Among them are:

4.5.1 National Urban Development Policy (PNDU): The PNDU sets guidelines for urban planning and management in Brazil. According to the Ministry of Cities (2019), the PNDU aims to integrate housing, sanitation, urban mobility, and environmental management policies, promoting sustainability and social equity. The PNDU emphasizes the importance of participatory and integrated urban planning involving the community and various government sectors.

4.5.2 City Statute (Law No. 10.257/2001): A legal framework regulating land use in urban areas in Brazil. It introduces urban management instruments such as the Master Plan, which must be developed by municipalities with more than 20,000 inhabitants. According to Rolnik (2015), the City Statute promotes the social function of urban property and the right to the city, seeking to balance private interests with the common good. However, the effective implementation of master plans has faced challenges, including a lack of technical capacity and resources in municipalities.

4.5.3 National Urban Mobility Plan (PNMU): The PNMU (Law No. 12.587/2012) sets guidelines for organizing urban transportation in Brazil. The PNMU encourages the use of sustainable transportation modes, such as public transport, bicycles, and walking. According to Aragão

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(2014), the PNMU aims to reduce greenhouse gas emissions and improve urban quality of life. However, the implementation of the PNMU has been uneven across Brazilian cities, with some municipalities progressing faster than others.

4.5.4 My House My Life Program (Minha Casa Minha Vida): The My House My Life Program (Minha Casa Minha Vida) (PMCMV) is a federal initiative aimed at reducing Brazil's housing deficit, especially among low-income families. According to Cardoso and Aragão (2016), the PMCMV has significantly contributed to increasing access to housing, although there are criticisms about the location of housing, often in peripheral areas with insufficient urban infrastructure. Integrating sustainability criteria into the PMCMV has been an ongoing challenge.

4.5.5 National Basic Sanitation Plan (PLANSAB): The PLANSAB (Law No. 11.445/2007) sets goals to universalize access to basic sanitation services in Brazil. As reported by Heller (2017), PLANSAB is fundamental to improving public health and environmental protection. A lack of adequate investments and the complexity of managing sanitation services are significant challenges to the full implementation of the plan.

4.5.6 National Solid Waste Policy (PNRS): The PNRS (Law No. 12.305/2010) establishes guidelines for integrated management and environmentally sound management of solid waste. According to Ferreira (2015), the PNRS promotes shared responsibility for the product life cycle, encouraging recycling and reducing waste generation. The effective implementation of the PNRS faces challenges such as informality in the recycling sector and the need for greater integration between different levels of government.

5. DISCUSSION OF RESULTS

The literature review indicates that sustainable urban planning involves an integrated and participatory approach that takes into account social, economic, and environmental aspects. Policies that promote the creation of green spaces, the use of innovative technologies, and community participation are fundamental to achieving urban sustainability. Practical examples of cities that have successfully implemented urban sustainability policies illustrate how different approaches can be adapted to specific contexts to promote the sustainable development of cities.

Although Brazil has a wide range of policies aimed at sustainable urban planning, the implementation of these policies faces significant challenges. Limited technical and financial capacity of municipalities, lack of integration between sectoral policies, and insufficient community participation are recurring obstacles. To overcome these challenges, it is necessary to strengthen urban administration, enable the technical training of public managers, and increase investments in infrastructure, particularly sustainable ones.

In addition, technological advancements such as Urban Digital Twins and Geographic Information Systems (GIS) can provide valuable insights for planning and effectively implementing urban policies. These technologies allow predictive analyses and simulations of urban environments, facilitating better decision-making processes. However, their implementation depends on investment and the development of local technical capacity.

The benefits of implementing green infrastructures, such as parks, green roofs, and sustainable urban drainage systems, are clear. These initiatives contribute to improving the quality of life in cities by mitigating urban heat islands, managing stormwater more effectively, and creating recreational spaces that enhance the physical and mental health of residents.

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Moreover, they increase the resilience of cities to the effects of climate change, reducing the impact of extreme events such as floods and droughts.

However, integrating green infrastructures into urban planning often requires overcoming bureaucratic and financial barriers, especially in cities with limited budgets. It is crucial to create funding mechanisms and incentives that encourage the adoption of sustainable practices by public and private stakeholders.

6. CONCLUSION

To achieve sustainability in urban planning, it is essential to adopt an integrated and participatory approach, ensuring that policies benefit all segments of the population and contribute to the sustainable development of cities. The use of technologies such as Urban Digital Twins and Geographic Information Systems (GIS) can provide valuable insights for the planning and effective implementation of urban policies.

It is recommended that future public policies incorporate the following elements:

- Institutional Strengthening: Technically train public managers and increase investments in infrastructure, especially in sustainable technologies.
- Community Participation: Involve the community in all stages of urban planning to ensure that solutions are inclusive and meet local needs.
- Integration of Sectoral Policies: Promote the integration of housing, sanitation, urban mobility, and environmental management policies to maximize the benefits and efficiency of urban interventions.
- Monitoring and Evaluation: Develop and implement specific indicators to monitor the progress of urban sustainability policies and adjust strategies as needed.
- Financial Incentives: Create financing mechanisms and tax incentives to promote the adoption of sustainable practices, such as green infrastructure and energy efficiency.

These recommendations aim not only to improve immediate urban conditions but also to continuously advance towards more sustainable, resilient, and equitable cities.

Furthermore, raising public awareness and securing government support are crucial to overcoming financial and technical challenges in implementing green infrastructure and other sustainable practices. Collaboration among various stakeholders, including governments, businesses, non-governmental organizations, and the community, is essential for the success of urban sustainability policies.

This paper highlights the importance of sustainable urban planning for improving the quality of life in cities and promoting environmental sustainability. Practical examples of cities that have successfully implemented urban sustainability policies were included to illustrate how different approaches can be adapted to specific contexts.

For future research, it would be interesting to investigate current policies in Brazil in more detail and analyze the economic feasibility of the proposed solutions. Additionally, including specific case studies could provide valuable insights into the practical implementation of urban sustainability policies.

Current urban planning policies in Brazil have the potential to promote more sustainable and inclusive urban development. However, the effectiveness of these policies depends on their practical implementation and the ability of municipalities to adapt and integrate these guidelines into their specific contexts. Strengthening institutional capacity and promoting a participatory and integrated approach are essential to achieving urban sustainability goals in Brazil.

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7. REFERENCES

ALIPOUR, D.; DIA, H. **A systematic review of the role of land use, transport, and energy-environment integration in shaping sustainable cities**. Edição 8. Rev. Sustainability. Editora MDPI, 2023. Disponível em: https://www.mdpi.com/2071-1050/15/8/6447.

ARAGÃO, J. A. de. **Plano Nacional de Mobilidade Urbana: Avanços e Desafios**. Revista Brasileira de Mobilidade Urbana, v. 2, n. 1, p. 45-59, 2014.

BARRESI, A. **Urban Digital Twin e planejamento urbano para cidades sustentáveis**. TECHNE - Revista de Tecnologia para Arquitetura e Meio Ambiente , n. 25, pág. 78–83, 2023. DOI: 10.36253/techne-13568. Disponível em: https://oaj.fupress.net/index.php/techne/article/view/13568 . Acesso em: 2 jun. 2024

BERAWI, M. Ali; SARI, M.; MIRAJ, P. **Desenvolvimento de cidades inteligentes sustentáveis para melhorar a qualidade de vida e o bem-estar dos cidadãos**. CSID Journal of Infrastructure Development, v. 1, pág. 1, 2023. Disponível em: https://scholarhub.ui.ac.id/cgi/viewcontent.cgi?article=1088&context=jid

BOSTAN, E. **Multidisciplinary approaches to urban planning.** Urban Development Journal, v. 22, n. 2, p. 98-110, 2020.

CARDOSO, A. L.; ARAGÃO, T. M. **O Programa Minha Casa Minha Vida e a promoção da sustentabilidade urbana.** Habitação e Sociedade, v. 19, n. 2, p. 99-114, 2016.

CHIARA, I. D. et al. **Normas de documentação aplicadas à área de Saúde**. Rio de Janeiro: Editora E-papers, 2008.

DE SOUSA SILVA, F.; et al. **Environmental inequalities in Brazilian cities: a review of empirical evidence.** Urban Studies, v. 55, n. 5, p. 1119-1137, 2018. Disponível em: https://www.mdpi.com/2073-445X/7/4/134

ENOGUANBHOR, Evidence Chinedu. **Assessing urban spatial patterns within the implemented urban planned areas using GIS and remote sensing data**. International Journal of Multidisciplinary Perspectives, v. 4, n. 1, p. 87-96, 2023. Disponível em: https://www.academia.edu/download/102469614/14.04.01.2023_assessing_urban_spatial_patterns.pdf

FERNANDES, E. **The challenge of informal settlements in Brazil: A legal and urban perspective**. Land Use Policy, v. 77, p. 811-819, 2018.

FERREIRA, L. **Gestão de resíduos sólidos urbanos no Brasil: desafios da implementação da Política Nacional de Resíduos Sólidos**. Revista de Administração Pública, v. 49, n. 4, p. 923-941, 2015.

FERREIRA, L. **Planejamento urbano e desigualdades ambientais: uma análise crítica**. *Revista Brasileira de Planejamento Urbano*, v. 12, n. 3, p. 40-50, 2015

GALVÃO, G. A. de S.; CASTRO, H. G. de T.; COSTA, B. R. de B.; JUNIOR, G. M.; PELLANDA, P. C. **Aplicação de Gêmeos Digitais em um ambiente BIM de monitoramento de estruturas de edificações.** In: SIMPÓSIO BRASILEIRO DE TECNOLOGIA DA INFORMAÇÃO E COMUNICAÇÃO NA CONSTRUÇÃO, v. 4, p. 1-11, 2023. Porto Alegre: ANTAC, 2023.

GEHL, J. **Cities for People**. Washington, DC: Island Press, 2010.

HELLER, L. A. **Desafios da universalização do saneamento básico no Brasil.** Engenharia Sanitária e Ambiental, v. 22, n. 3, p. 451-463, 2017.

IPEA. **Indicadores de Desenvolvimento Sustentável**. Disponível em: https://odsbrasil.gov.br/objetivo11/indicador1111. Acesso em: 15 abr. 2023.

JANISZEK, B.; KRZYSZTOFIK, R. **Green infrastructure in urban areas: benefits and challenges**. Ecological Indicators, v. 97, p. 35-42, 2023. Disponível em: https://www.mdpi.com/2071-1050/15/11/8928

Periódico Técnico e Científico Cidades Verdes
Technical and Scientific Journal Green Cities
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KHALEEFAH, N.; ALWAN, W. S. **Green Zone Planning for City Sustainability.** In: IOP Conference Series: Earth and Environmental Science. IOP Publishing, 2022. p. 012075. Disponível em: https://iopscience.iop.org/article/10.1088/1755-1315/961/1/012075/pdf

KHULMAN, T.; FARRINGTON, J. **What is sustainability?** Sustainability, v. 2, n. 11, p. 3436-3448, 2010. Disponível em: https://www.mdpi.com/2071-1050/2/11/3436

MEDEIROS, E.; VAN DER ZWET, A. **Sustainable and integrated urban planning and governance in metropolitan and medium-sized cities.** Sustainability, v. 12, n. 15, p. 5976, 2020. Disponível em: https://www.mdpi.com/2071-1050/12/15/5976

MINISTÉRIO DAS CIDADES. **Política Nacional de Desenvolvimento Urbano.** Brasília: Ministério das Cidades, 2019.

MONTEIRO, A. **Resilience in Brazilian urban planning: Addressing natural disasters**. Urban Studies, v. 58, n. 4, p. 745-760, 2020.

ORGANIZAÇÃO DAS NAÇÕES UNIDAS. **Transformando nosso mundo: a Agenda 2030 para o Desenvolvimento Sustentável.** Nova York: ONU, 2015. Disponível em: https://brasil.un.org/sites/default/files/2020-09/agenda2030-pt-br.pdf

RABINOVITCH, J. **Innovative land use and public transport policy: The case of Curitiba, Brazil**. ScienceDirect. Land Use Policy, v. 9, n. 1, p. 51-67, 1992.

REDE DE MONITORAMENTO DA SOCIEDADE CIVIL. **Relatório Luz da Sociedade Civil sobre a Agenda 2030 de Desenvolvimento Sustentável.** Brasília: Rede de Monitoramento da Sociedade Civil, 2023. Disponível em: https://gtagenda2030.org.br/relatorio-luz/relatorio-luz-do-desenvolvimento-sustentavel-no-brasil-2023

ROLNIK, R. **O Estatuto da Cidade e a gestão democrática do solo urbano no Brasil.** Cadernos Metrópole, v. 17, n. 33, p. 15-34, 2015.

SABOYA, R. **The collective and progressive nature of urban planning**. Journal of Urban Studies, v. 27, n. 1, p. 12-24, 2019. Disponível em: https://journalppc.com/RPPC/article/download/393/238

SHAKER, R. R.; et al. **Holistic impact assessment in urban sustainability**. Journal of Environmental Management, v. 255, p. 109-119, 2022. Disponível em: https://www.mdpi.com/2071-1050/14/24/16830

SILVA, M. R.; ALMEIDA, J. P. **Desigualdade socioambiental em áreas urbanas: um estudo de caso**. Cadernos de Geografia, v. 25, n. 2, p. 99-110, 2018

SOARES, R. M. et al. **Planejamento urbano sustentável e a mitigação das desigualdades ambientais.** Revista de Estudos Urbanos e Regionais, v. 29, n. 1, p. 70-85, 2017.

SOUSA, P.; ALMEIDA, F. **Digital transformation in urban planning: The role of urban digital twins**. Brazilian Journal of Urban Management, v. 35, n. 2, p. 123-134, 2021.

SPILIOTOPOULOU, M.; ROSELAND, M. **Barriers to sustainable building practices in urban areas**. Urban Sustainability, v. 18, n. 1, p. 45-59, 2022. Disponível em: https://link.springer.com/article/10.1007/s43621-022-00081-y

SROKA, W.; LORENCOVÁ, E. **The integrated approach to sustainable urban development**. Environmental Policy Journal, v. 26, n. 3, p. 199-217, 2022.

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL. **Green Infrastructure: What is it and how can it help your city?** Disponível em: https://efc.web.unc.edu/2021/06/28/green-infrastructure-what-is-it-and-how-can-it-help-your-city/ . Acesso em: 1 jun. 2024

WANG, H. **Data-driven urban planning**. Planning and Development Review, v. 18, n. 3, p. 159-170, 2020.

WONG, T. C. **Planning Singapore: From Plan to Implementation.** Singapore: Institute of Southeast Asian Studies, 2013.