



Urban diversity in the Amazon and global agendas for urban sustainability: proposals and challenges for the Mesoregion of Marajó – Pará

Monique Bruna Silva do Carmo^{1*}; Welbson do Vale Madeira²; Heloísa Corrêa Pereira³; Paula Regina Humbelino de Melo⁴; Camila Amaral Pereira⁵; Juan Carlos Amilibia⁶; Renata Maciel Ribeiro⁷

¹ Instituto Nacional de Pesquisas Espaciais – moniquebruna@ymail.com,

² Universidade Federal do Maranhão – welbson.madeira@ufma.br

³ Instituto de Desenvolvimento Sustentável Mamirauá OS-MCTI – heloisa.pereira@mamiraua.org.br

⁴ Universidade Federal do Amazonas – paulamelo@ufam.edu.br

⁵ Instituto de Pesquisa Econômica Aplicada – camilaeconomia@outlook.com

⁶ Provita ONG – Venezuela – jambilibia@provitaonline.org

⁷ Instituto Nacional de Pesquisas Espaciais – renata.ribeiro@inpe.br

* Monique Bruna Silva do Carmo – moniquebruna@ymail.com,

ABSTRACT

The process of urbanization in the Amazon region has been inadequately and incompletely addressed in global agendas for urban sustainability. This highlights the deficiency of the technical-operational apparatus of these agendas as evaluative tools, within the context of an urban environment shaped and consolidated in a socio-environmental complex and diverse setting. This article aims to contribute to this debate and encompasses five thematic dimensions related to the urbanization process in the Amazon: socio-environmental, economic, public management, education, and social organization. It suggests strategies for adapting some existing urban sustainability indicators to a specific socio-territorial context, the Marajó Mesoregion in the state of Pará, Brazil. To do so, the Sustainable Development Goals (SDGs) are adopted as a basis for discussion, and new metrics for urban sustainability are proposed. The results are synthesized in a framework of indicators that can help understand urban sustainability in a context of diversity and complexities, highlighting the importance of interdisciplinary approaches to grasp subtle elements that emphasize urbanization initiatives that do not conform to the single model and narrative of what is understood as a city and the urban phenomenon.

Kwywords: urban diversity; urban sustainability; small cities; Marajó Mesoregion.

Introduction

In an attempt to overcome the so-called “demographic void,” policies to integrate the Amazon region were established after the 1960s, resulting in population concentration in cities that lacked basic infrastructure and urban services. The expansion of urban areas in the Amazon impacted the forest, fragmented the socio-spatial relations of cities, and generated territorial changes that are still visible today. As highlighted by Becker (1985), even though the process of urbanization in the region has been significant, these are cities that still lack basic urban infrastructure, employment, and service generation.

Historically, the process of Amazonian occupation, restructured by economic fronts and policies created in the 20th century, aimed at expanding the agricultural frontier towards the Midwest and North of Brazil. This occurred through the expansion of the agricultural frontier, with the presence of large landowners and agricultural companies (IANNE, 1979; PINTO, 1980). Becker (1990) also draws attention to the presence of large extractive economic projects that led to the formation of company towns, resulting from the diffusion and spontaneous or planned formation of cities and towns to meet the needs of industrial complexes. In addition to these aspects, the pattern of organization of the Amazonian urban territory is rooted in different landscapes, such as river-floodplain-forest cities and road-upland cities (GONÇALVES, 2001). In the case of river-floodplain-forest cities, there are riverside cities that follow an occupation pattern linked to the river and the forest. According to Oliveira (2006), riverside towns are urban centers situated along the banks of rivers with diverse spatialities, which are often connected to pre-existing local structures. “It is necessary to understand the territory that results from this process, which reflects not only harsh living conditions but also resistance and unwavering strength to build a new life that is not necessarily better or worse, but different” (OLIVEIRA, 2006, p. 9). The cities in the Marajó Mesoregion fit into this logic.

Marajó Island is composed of 15 municipalities, of which 13, namely Afuá, Anajás, Bagre, Chaves, Cachoeira do Arari, Curralinho, Gurupá, Melgaço, Muaná, Ponta de Pedras, Salvaterra, Santa Cruz do Arari, and Soure, are considered small cities with less than 21,000 inhabitants (IBGE, 2020). Among other infrastructure deficiencies, there are cities that lack landfill sites due to being surrounded by private farms, such as Soure, and others that, due to their location in flood-prone areas, dispose of garbage near urban centers, burn it in sawmills, or dump it directly into rivers, as is the case in the city of Afuá (CARMO, 2020).

According to Quintela *et al.* (2018), Marajó is an example of the coexistence of tradition and modernity, with its disputes and conflicts, which, in line with this article's proposal, is representative of urban diversity. Therefore, as a strategy for urban sustainability on Marajó Island, it is considered necessary to build academic approaches capable of capturing the territory's specificities in relation to the Sustainable Development Goals (SDGs) established by the UN (2016) for cities. Considering the SDGs, which establish the simultaneous optimization of social inclusion, economic growth, and environmental protection as a fundamental axis (UN, 2016), the 2030 Agenda proposes 17 goals to guide national policies and possible international cooperation activities in the coming years.

Although considered a comprehensive and broad approach, Hickel (2019) points out that there are two sides of this Agenda that are at imminent risk of contradiction: one side advocates for a harmonious relationship between humans and the natural environment, establishing limits on resource use at the level of planetary resilience and measures to contain climate change; and the other side appeals for continuous global economic growth, supporting an assumption that allows maintaining current or higher levels of economic growth. These contradictions also reflect the perspective of cities and demonstrate the inability to fulfill this agenda in the context of SDG 11 - Making cities and human settlements inclusive, safe, resilient, and sustainable - while seeking to fulfill SDG 8 - Promoting inclusive and sustainable economic growth, full and productive employment, and decent work for all. In this regard, the guiding question of this article is: *how can alternative paths be built that prioritize the link between cities and nature, considering an urbanization process that emerges and grows in a specific context?*

To advance in constructing answers to this and other questions, based on Ribeiro *et al.* (2021), who defines urban sustainability in the Amazon as a multi-dimensional system that encompasses: (i) traditional knowledge combined with technologies for territorial planning and management, (ii) paradigm shifts in consumption, land, and resources by valuing everyday practices, (iii) understanding the political-economic dynamics underlying the processes of production and reshaping of space, and finally, (iv) the resumption of development based on non-predatory use of socio-biodiversity resources, with cities and their surroundings as the basis for their reproduction. These elements of discussion help guide the understanding of the necessary dimensions of analysis for urban sustainability in the context of cities on Marajó Island.

To achieve this, the article is divided as follows: i) discussion on the society-nature relationship in the socio-territorial context of the analysis to com-

pose the socio-environmental dimension; ii) discussion on economic dynamism to compose indicators for the socio-economic dimension; iii) discussion on urban infrastructure to compose indicators for the territorial management dimension; iv) discussion on the potential of planetary health to compose indicators for the education for sustainability dimension; v) discussion on the importance of civil society organization to compose indicators for the social organization dimension. Finally, as an annex, we propose a table with a synthesis of proposed metrics to assess the applicability of the SDGs to the region, considering the themes discussed in the previous sections.

Socio-environmental dimension: society-nature relationship

Life on Marajó Island is deeply rooted in the relationship between its people and nature, as it is a source of livelihood, a promoter of life, and a keeper of memories that perpetuate the history of the place. It is through the proximity to the natural environment that humans, land, rivers, and seas remain interconnected, a relationship that becomes more pronounced with the development of productive activities. In the specific case, the indigenous civilizations that settled in Marajó over 3,000 years ago left intriguing evidence, especially landscapes that brought fame to the world's largest deltaic island (ECURED, 2023). Currently, Marajó has its own culture, linked to livestock farming and buffalo rearing – meat that is prepared as a typical dish in regional cuisine, where the animals are raised on vast, often isolated, farms.

The use of the environment by humans is perceived as an essential human activity for survival, through which humans transform nature and are transformed by it, where they produce and reproduce their existence, shaping the history of social beings (FERREIRA, 2006). The natural space, when adapted or incorporated into contemporary modernization, has become the locus of production and exchange activities. At the same time, modernity has presented humans with dilemmas and contradictions of a society that has moved and continues to move ever faster towards progress (CASTRO, 2017). The environment, understood as a concentration of natural resources, has become an object of interest and has been transformed into a system of production and exploitation. In this context, according to Sathler *et al.* (2009), the economic-spatial integration promoted by globalization has not been sufficient to reduce inequalities in the Amazon. This reality is reflected on Marajó Island.

In the early 18th century, the Marajoara economy was dependent on natural products such as rubber and Brazil nuts, which were responsible for the creation and expansion of settlements (COSTA *et al.*, 2022). In 1960, livestock farming based on traditional large estates became even more prominent in the economy due to the local environment, with the presence of extensive flooded fields. Nowadays, economic practices persist with the presence of large land-owners who, through buffalo production, share extensive wetland areas with the riverside population living along streams and rivers, engaging in extractive economic activities. Moreover, while economic relations in the region used to occur at a local and regional level, in recent times they occur at different scales but in a disjointed manner (BROWDER; GODFREY, 2006).

In general terms, despite the relationships established between society and nature, issues related to climate change, rampant use of biodiversity, and the resulting increase in poverty have been factors that limited the region's development. A study by Santos *et al.* (2021) on the vulnerability of municipalities in the coastal region of Pará state shows that the most exposed and vulnerable municipalities to climate change and extreme events are in the Marajó Island region. Extreme climate events, such as precipitation and temperature anomalies, have led to climate changes that are already affecting socio-environmental relationships, resulting in an increasing intensification of vulnerability in the region.

According to the UNDP (2013), municipalities on Marajó Island such as Melgaço (0.418), Chaves (0.453), Bagre (0.471), and Anajás (0.484) have not achieved 20% access to seven prenatal consultations, with the exception of Afuá (0.489) and Portel (0.483), which have low HDI compared to other Brazilian municipalities. The sociodemographic aspect of the region is a factor that exacerbates and makes these cities even more sensitive to socio-environmental vulnerabilities, as marginalized populations are living in these areas and they are the ones facing the greatest difficulty in adapting to environmental changes resulting from climate change.

Connecting to the identified issues for Marajó Island, we have SDGs 12 and 14, which address the relationship between humans and nature (SDG 12 - Ensure sustainable consumption and production patterns), in a context that is fundamentally based on rivers (SDG 14 - Conservation and sustainable use of oceans, seas, and marine resources for sustainable development). These are important objectives, but they lack an understanding of the specificities of the Amazonian Territory, highlighted here by the Marajó context, and also consider social, cultural, and environmental plurality as determining factors in the society-nature relationship (Table 1).

Therefore, for Marajó Island to serve as a study object for urban sustainability under the socio-environmental dimension, it is necessary to consider how the relationship between society and nature is maintained in the complexity of spatial planning in the Marajó territory. In this regard, rivers and forests are part of the spatial organization and dynamics of cities, serving as mediators for the movement of people and goods. The conservation of a healthy environment depends on the type of sustainable strategic development that occurs in a region or country. The socio-environmental dimension, based on the relationship between nature and society, should be perceived through responsible resource use, but more than that, it is necessary to think about the territory and its multiple social practices, the different uses of natural resources, and their specificities, which are essential for the conservation of ecosystems and human life.

Advancing in this discussion implies a new economic and environmental reality, considering the socio-economic dynamism and the different scales of spatial occupation in the Amazon. Furthermore, how these realities reverberate in the relationships between society and nature. As a result of this discussion, the following section highlights general elements that can contribute to the construction of an indicator system that accounts for the economic dynamism in urban and rural territorial dimensions, linked to the context of Marajó cities.

Socioeconomic dimension: economic dynamism

The urban economies of the Amazon have a high potential to stimulate biodiversity-based economies (SILVA, 2018). On the other hand, rural economies are crucial when it comes to the dynamics of Amazon's development, especially regarding social inclusion and sustainability (COSTA, 2015). As a result, it is possible to conceive indicators that connect these two dimensions, as we seek to demonstrate in Table 1 (attached).

The Brazilian federal government has established strategies to achieve the SDGs, highlighting the following (BRASIL, 2017): i) creation of a national commission to disseminate the goals and foster dialogue between federative entities and civil society, ii) effort to adapt global goals to the Brazilian reality, taking into account legislations, development plans, and programs iii) development of diagnostics on the national reality and local realities, establishment of national priorities, and mapping of existing policies. To understand the importance of economic dynamism for urban sustainability in the context of Marajó cities, we discuss the role of SDG 8, which aims to promote sustained, inclusive, and sus-

tainable economic growth, full and productive employment, and decent work for all. However, it is important to highlight its controversies, such as the premise of the relationship between economic growth and development and the possibilities of economic growth without environmental damage (GOIRIA; HERERA, 2021). That being said, one of the challenges for researchers and public managers in the Amazon is the consolidation of a system that points towards economic and environmental sustainability, values local productions and living conditions, and favors integrated, non-dichotomous urban-rural articulations.

In this sense, we understand that the significant contribution of the economy to sustainability is the understanding and adoption of measures, policies, and strategies aimed at regional autonomy and economic dynamism (Table 1). One experience in this regard can be observed in the Ponta Alegre community - located on the Canaticu River, in the municipality of Currálinho. This is the Embarca Marajó Project: navigating the Tide of Sustainability. This project provides access to banking services for populations living far from urban centers with better infrastructure, and strengthens initiatives such as the creation of social currencies.

Social currencies are important strategies for economic dynamism in small cities (YUNNUS, 2000). They are nurtured in community banks through solidarity-based financial services networks and have three main characteristics: i) resource management done by members of society, ii) an integrated system of local development that enables credit, production, marketing, and training simultaneously, and iii) the circulation of social currency in the territory, which is accepted and recognized by producers, traders, and consumers in the area, thus enabling the creation of an alternative market for families and strengthening internal exchange networks.

Local residents exchange their official currency (Reais) for a social currency, the value of which is restricted to a specific acceptance area, meaning only pre-registered commercial establishments that adhere to this particular economic circuit are able to receive this currency at its face value for the trade of goods and services (SILVA, 2017). This practice has been developed on Marajó Island and is an example of how economic and environmental sustainability can go hand in hand, favoring the construction of territorial knowledge based on local practices. As an effective result of the actions of the "Embarca Marajó Project: Navigating the Tide of Sustainability" in 2016, the first community bank of Marajó was created in the community of São Miguel do Pracuúba, in the municipality of Muaná. It is worth noting that there are other experiences in other states, such as the case of the online social currency, e-dinheiro, a virtual currency created

by Banco Palmas in Tocantins, adopted by several other agencies that are part of the Brazilian Community Banks Network. With this, it is suggested to demonstrate to the municipal public sphere the importance of joining initiatives that originate from the local sphere and are adapted to their socioeconomic context.

The broader actions of the SDGs draw attention to the need for promoting sustainable economic growth, but their local actions do not take into account the economic specificities of the territory and local practices as determining factors for promoting sustained economic growth. To ensure full and productive employment and decent work for all, it is necessary to consider that territorialization occurs based on the particularities of the place and to adopt more contextualized actions, considering a set of distinct factors, including social, economic, environmental, institutional, and cultural factors. Territorialization occurs based on different forms of appropriation and use of the territory. Each city, community, or village aggregates particularities in its sociocultural practices, which are determining factors in socio-spatial production.

In summary, given this clarification, in order to achieve Goal 8, which is "Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all," it is necessary to consider sustainable economic practices that are already being developed in some communities, recognizing territorial diversity together with the importance of this practice as a tool for sustainable economic planning in Marajó.

In addition to these aspects, the rural-urban spatial dimensions pose a challenge for more strategic articulation. The example of Marajó presents a promising scenario for socio-economic and environmental practices towards sustainability. However, these actions reflect the resilience of the population in the face of challenges posed by political and territorial management actions and policies that are appropriate to the reality of cities in the Amazon. We start from the premise that the urban diversity of the Amazon imposes challenges on the population, which must be overcome through management dimensions and strategic actions to address the diversity of cities in this vast region.

Territorial management dimension: urban infrastructure

The territorial organization of the Amazon, in the context of socio-spatial organization, is represented by the diversity of cities that have emerged at different historical moments, which have been, and still are, important in the economic and social structuring of urban space. It was in the 1960s that new urban

centers began to emerge in the Amazon rainforest, intensifying the urbanization process. Furthermore, according to Browdder and Goldfrey (1997), although Belém and Manaus have consolidated themselves as the main primacies, there was, at that time, a regional trend that led to the deconcentration of Metropolitan Regions, which continued in the following years, favoring the expansion of peripheral regions with the construction of new settlements, areas without infrastructure and basic urban services. Disconnected urbanization created a differentiated urban environment and favored the emergence of new inter and intra-urban relationships that are specific to the region. According to Carmo and Costa (2019), the territorial organization has resulted in distinct institutional and economic identities and in the process of urbanization in cities of the Amazon delta, including Marajó Island's territory.

According to Silva (2015), the production of urban space in cities is related to different factors, including the characteristics of the site and its situation, the role of the urban nucleus in the local and regional context in the face of the contradictions of capitalism, the territorial division of labor, and the composition of the urban network. Regarding the urban network, it should be understood that, in Marajó, cities play similar roles but with singularities and particularities. The urban centers of the Marajó Archipelago offer basic urban infrastructure services restricted to their residents, which, when compared to polarizing urban centers, become the most necessary goods for the life of local communities. As they are located far from the "core" areas, access to infrastructure and services is not concentrated in a single hub but rather in different locations.

The Report on Impact, Vulnerability, and Adaptations of Cities (2017) shows that many cities, towns, and local communities in the Northern region of Brazil are in a vulnerable condition, which aligns with the data on urban infrastructure and basic services of the cities on Marajó Island made available by IBGE (2010). It is observed that all cities were classified as areas of high socio-environmental vulnerability due to intense occupation of floodplain areas. Because they are located in flood-prone areas and lack urban infrastructure services such as sewage treatment and access to treated water, these cities are highly environmentally vulnerable and may suffer from the effects of increased rainfall intensity and rising sea levels. On the other hand, Marajó cities have fewer resources and environmental oversight, and therefore urban management lacks specific urban and environmental public policies to minimize the problems encountered.

According to Costa and Brondizio (2017), the urban areas of the Marajó Archipelago, for the most part, are integrated into the urbanization process that has been consolidated in the region over the past 20 years. However, the

concentration of urban centers has always occurred slowly and in a non-concentrated manner. These are urban centers with limited infrastructure and are also reliant on the allocation of public funds (COSTA *et al.*, 2008). Alongside urban areas in floodplain regions, there are also upland areas (Figure 1) that have been organized over the years as cities' urban areas expanded. Thus, it is possible to find cities in upland areas or the presence of both floodplain and upland within the same city.



Figure 1 Floodplain and upland areas in the city of Ponta de Pedras, PA. *Source:* Valota, 2015.

There is a lack of access to urban infrastructure services, which hinders the quality of basic services provision, such as sewage treatment, treated water, garbage collection, and waste treatment. In a study conducted by Mansur *et al.* (2016) in the delineation of the Amazon River delta region, which includes all cities in Marajó Island, approximately 80-90% of the urban population is living in vulnerable conditions due to the combination of lack of sanitation services and unplanned settlements in unsuitable areas. Furthermore, according to the same

authors, less than 20% of the riverine population in the delta have housing with access to sewage collection services, with collection being virtually non-existent in small towns (MANSUR *et al.*, 2016). Access to treated water, as well as sanitary sewage treatment, is inadequate and brings environmental problems, primarily related to public health. There are still dwellings without access to treated water, and many still use river water for domestic chores and consumption (CARMO, 2020). Many homes lack a drainage system, and domestic sewage is discharged directly into rivers (Figure 2).

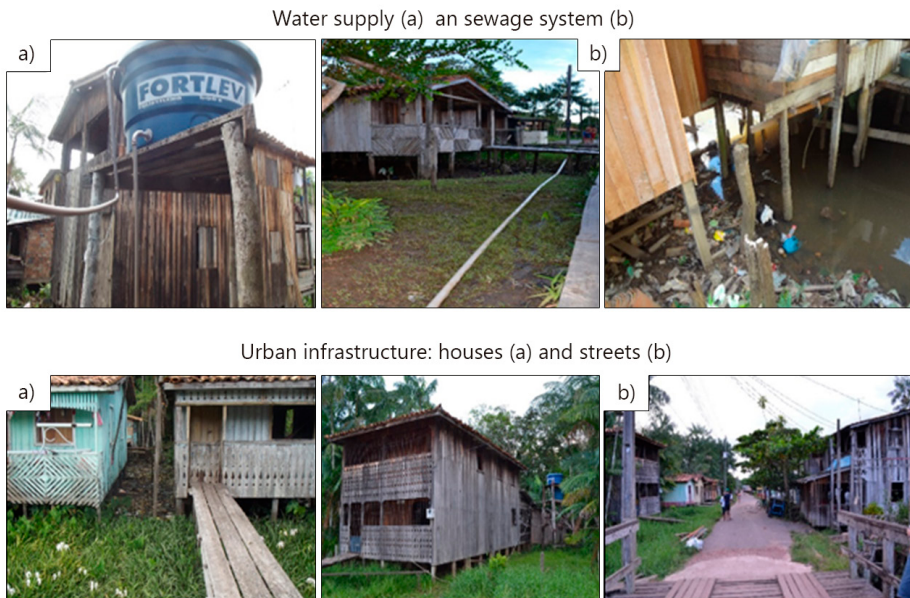


Figure 2 Neighborhood in a floodplain area in Ponta de Pedras – PA. *Source:* Carmo, 2020.

There is a disconnection between public policies and services (at the local, regional, and federal levels) and the local reality. The precariousness of these services has not been overcome by infrastructure public policies, nor have they been planned with consideration for the urban diversity of Marajó. It is necessary for public policies, as well as the SDGs, to have a sensitive approach to the region, as there are multiple territorialities (HASBAERT, 2005) that need to be recognized, just like in other cities in the Amazon. Therefore, these metrics need to be designed for local realities, taking into account their particularities, so that appropriate urban infrastructure public policies for urban diversity are

implemented (TRINDADE JR. 2010). In order for Marajó cities to be sustainable, the main framework should be the promotion of a debate that includes the particularities of the urban area in the Amazon.

Regarding territorial management, SDGs 6 (Ensure availability and sustainable management of water and sanitation for all), 7 (Ensure access to affordable, reliable, sustainable, and modern energy for all), 9.1¹, and 11.2² highlight different elements necessary for the analysis of infrastructure in cities, such as access to public services for basic sanitation, electricity, and urban mobility. Given the context of urban diversity on the island, in order to achieve these goals and targets, it is necessary to recognize the different types of urban areas existing in Marajó Island and engage in discussions with public bodies to propose the implementation of basic infrastructure services in each urban area (Table 1). The main objective is to ensure that local particularities are considered in management plans. This factor will be crucial in providing an overview of the most vulnerable areas in terms of access to urbanity (urban infrastructure), through the implementation of public policies and services that are aligned with the territorial reality of Marajó Island.

Specifically, SDG 11's second goal addresses urban mobility, a challenge that needs to be approached according to the particularities of each region. In Marajó, intra-urban mobility is carried out by residents in rural areas who need to travel to the urban centers of the nearest cities. Inter-urban mobility occurs when residents of the cities need to travel to major urban centers, usually looking for services not available in their region, such as specialized healthcare and banking services. In the case of municipalities on Marajó Island, travel usually occurs towards Belém and Macapá, depending on the location and proximity. According to Bartoli (2020), the diffusion of adapted engines for rustic boats has been fundamental for the movement of people between their communities and commercial centers and their surrounding areas of influence.

In Marajó Island, the transportation of people and goods is carried out through multimodal means in waterways, and crossings can be made by speed-

1. Develop quality, reliable, sustainable, and resilient infrastructure, including regional and cross-border infrastructure, to support economic development and human well-being, with a focus on equitable access and affordability for all.

2. By 2030, ensure access to safe, affordable, sustainable, and accessible transport systems for all, improving road safety through the expansion of public transportation, with special attention to the needs of people in vulnerable situations, women, children, persons with disabilities, and older persons.

boats (taking up to 2 or 3 hours), ships (taking from 4 to 40 hours), or “rabetas”³. Depending on the route and type of transportation, trips can take anywhere from 2 to 40 hours between cities on the island. SDG 11.2 discusses access to safe, affordable, accessible, and sustainable transport systems for all, improving road safety through the expansion of public transportation, with special attention to the needs of vulnerable populations, women, children, persons with disabilities, and the elderly (UN, 2022). However, it does not mention the inclusion of waterway transport systems. According to Bartoli (2020), river transport in the Amazon has a significant influence on the structuring of the urban network and, especially, the construction of diverse territorialities. They represent “territorialities of diverse networks of subjects, with the formation of territorial systems” (BARTOLI, 2020, p.33).

Given urban diversity, in order to achieve the goal of “Making cities and human settlements inclusive, safe, resilient, and sustainable,” it is necessary to recognize the different types of urban areas existing in Marajó Island and engage in discussions with public bodies to propose the implementation of basic infrastructure services in each urban area. The main objective is to ensure that geographical particularities (location, construction of adequate housing, and implementation of urban infrastructure) are considered in management plans. This factor will be crucial in providing an overview of the most vulnerable areas in terms of access to urbanity (urban infrastructure), through the implementation of public policies and services that align with the territorial reality of Marajó Island.

Dimension of Education for Sustainability: Planetary Health

Planetary health is a concept that fosters a field of transdisciplinary research, essential for understanding the interrelationship and interdependence between humans and the environment (WHITMEE *et al.*, 2015). The concept provides practical foundations and aims to safeguard the health of the planet and, consequently, the health of people through individual and collective actions. As a transdisciplinary approach, Planetary Health allows for connections across all areas of knowledge. Therefore, it is a discussion that proposes a new approach to the Sustainable Development Goals (SDGs) by incorporating metrics that

3. “Rabeta” is a small propulsion engine that is attached to the hull.

encompass urgent issues discussed within the context of the 2030 Agenda and urban diversity in the Brazilian Amazon. Teaching children and youth through Planetary Health Education involves fostering dialogues across diverse areas of knowledge, emphasizing responsibility for human and environmental health. It empowers children and youth to become future leaders in emerging issues and provides them with improved living conditions.

As planetary health is a cross-cutting approach, it's possible to observe it permeating all the goals of every SDG. However, in this topic, the discussion is focused on the SDGs associated with the theme of Education (SDG 4 - Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all), discussing its goals and the need for adaptations to the socio-territorial context of Marajó. In this sense, the Sustainable Cities Program (PCS, 2017) complements this SDG and emphasizes the need to integrate formal and non-formal education, including knowledge, values, and skills.

The municipalities of Marajó Island have 1,255 schools, with 143 schools located in urban areas and 1,112 officially designated as rural areas, serving 172,573 enrolled students. Out of the total number of enrolled students, 68,722 study in urban areas, and 103,851 in rural areas (TCMPA, 2022). In 2022, a report from the Project to Strengthen Education in municipalities of the state of Pará was published, highlighting the need to develop actions in Marajó, considering the existing educational problems, with indicators pointing to low performance of the education system in all municipalities of the Archipelago and high dropout rates.

A relevant data highlighted in the Basic Education Development Index (IDEB) report is the average failure rate in the municipalities of Marajó, indicating that the average student failure rate is 17.22% in the early years and 15.21% in the final years, which is the highest failure rate in the state of Pará, also resulting in high rates of age-grade distortion. All these issues are interconnected with other indicators, such as Adequate Learning, assessed based on data from the Prova Brasil, which indicates insufficient levels of adequate learning in the basic education level of students in Marajó (TCMPA, 2022).

Given the educational scenario presented in these reports for Marajó Island, it is important to consider that there are quantitative indicators that, although needing strengthening, provide a general diagnosis of formal education. Therefore, the decision was made to present new indicators that can contribute to a more comprehensive and inclusive understanding of education, highlighting the particularities of the Amazon region, specifically Marajó Island. The proposed metrics for Education for Planetary Health aim to emphasize the need to

better represent the aspects of non-curricular education, which shape ways of life and are strongly interconnected with nature (Table 1). One of the important factors is to understand the residents' perception of the environment they live in, considering the fragility of the environment they inhabit. Thus, the proposed metrics intend to (re)consider educational and institutional practices that foster a critical, responsible, and resilient formation with the environment, considering the issues that severely impact human and environmental health.

Dimension of social organization: civil society organization

The strategies adopted by the United Nations (UN) to achieve the SDGs include mobilizing the necessary means to implement a work agenda via global partnership involving different actors at various levels (UN, 2015), such as local governments, non-state actors, civil society, and the private sector. In this context, national governments are responsible for implementing work agendas to achieve development goals. However, there is a significant presence of non-state actors involved, considered effective and innovative instruments for sustainable development policy (BEISHEM, 2012; BOECHA, 2021).

The presence of different social actors in the implementation of public policies with global or national goals is extremely important for the consolidation and legitimacy of sustainability agendas. In this strategic context, Civil Society Organizations (CSOs) play a relevant role, particularly as protagonists in multi-level relationships that involve national, global, and multilateral relations focused on the SDGs (MELLO; PEREIRA, 2022). These organizations emerge through social participation, focusing on the development of actions of public and collective interest, without profit motives (MELLO; PEREIRA, 2022), and play an important role in local organizations and in the effectiveness of public policies, as well as contributing to the adoption of context-specific policies and fostering necessary social changes.

In Brazil, there are 815,676 active civil society organizations, with 41.5% of these organizations concentrated in the Southeast region, 24.7% in the Northeast, and the North region ranking last, accounting for 7.2% of the country's CSOs (IPEA, 2021). On Marajó Island, the context of organizations reflects the need to consider strategic actions for investment and support for regional-level organizations. A study conducted by the "Escuta Marajó" program, as part of the Viva Marajó project, mapped civil society organizations and leaders operating in the region - a total of 62 organizations - and found that half of them are represen-

ted by entities of civil society organizations, while the other half by institutions connected to the public setor.

The institutions with the greatest presence in the region are part of the Territorial Development Collegiate of Marajó (CODETEM), related to the Territory of Citizenship - a policy coordinated by the Ministry of Agrarian Development (MDA) - representing the largest network of coordination in the region. The leadership composition includes members of Marajó's civil society, such as the social movement of fishermen, women's groups, rural workers, cultural organizations, and the Catholic Church through the Prelature of Marajó and the Diocese of Ponta de Pedras. In addition to these institutions, the study by the "Escuta Marajó" program highlights the actions of organizations such as the Marajó Museum, Caruanas - culture and ecology, and Lupa Marajó, as well as research institutions such as the Emilio Goeldi Museum, which maintains a scientific base on Marajó Island (Ferreira Penna Scientific Station in the Caxiuanã National Forest).

All of these institutions represent a strong possibility for regional coordination, forming partnerships to articulate the necessary actions to address the need to include the agenda of urban diversity in the Amazon within the context of the SDGs. However, the activities and investments directed towards institutions in this region have certain weaknesses, such as ensuring the financial sustainability of institutions that are considered isolated from major centers. It is important to guarantee the autonomy of these organizations, providing security for them to act comprehensively and effectively, especially in terms of monitoring socio-environmental public policies (INSTITUTO PEABIRU, 2013). Civil society organizations have a relevant role as social agents in the implementation of the global agenda, considering the alignment between their areas of operation and the SDGs' goals. Thus, CSOs work together with government institutions, defining strategies for action and project monitoring. Without the necessary investment, these institutions are unable to operate at different levels of organization.

In the context of the SDGs, social organization and civil society participation in decision-making spaces are addressed within the context of SDG 16, Goal 7 - Ensure responsive, inclusive, participatory, and representative decision-making at all levels. In 2014, the Civil Society Working Group for the 2030 Agenda (GT Agenda 2030) was created, composed of 50 participants, including NGOs, social movements, forums, and Brazilian foundations (ESCUERDO, 2020). The actions of the GT ranged from raising awareness about the SDGs, highlighting their impacts on people and territories, to gathering, analyzing, and produc-

ing content that captures the effectiveness of actions aimed at achieving the goals. This is annually disseminated through the 'Relatório Luz' (Light Report). (GT Agenda 2030, n.d.). Among the institutions participating in the GT, only the International Education Institute of Brazil (IEB) operates in the Marajó region, indicating the need to include institutions representing organizations located in the riverine cities of the Amazon.

On a larger scale, the implementation of the SDGs in Brazil presents a series of challenges that reflect the context of multiple economic and political crises contrary to democracy and environmental policies, which compromises alignment towards the causes led by the UN and reverberates in the achievement of established goals. It is in this sense that increasing social participation in decision-making becomes necessary, considering that residents are familiar with the needs of their cities, as well as increasing the number of initiatives to strengthen and support civil society organizations operating in the region.

These overlapping issues highlight the need for assistance in the process of implementing goals, adapting, and monitoring existing indicators. Considering these aspects, the contribution of this work is to suggest metrics to observe the participation of CSOs in decision-making spaces, their strength in serving the population, financial sustainability, and gender and ethnic equity in these social spaces (Table 1).

Conclusions

The 2030 Agenda proposes new perspectives for sustainably overcoming unequal development, both in Brazil and worldwide. But how do these goals encompass cities like those on Marajó Island? How can they contribute to overcoming the multiple territories and their environmental, cultural, economic, geographical, and social particularities? The discrepancy between the expectations set by the indicators derived from this Agenda and the local reality reinforces the inadequacy of operational-methodological frameworks for studying urban sustainability in the Amazon. This fact reveals the need to incorporate processes that originate and define the characteristics of the Amazonian urban context and the importance of an approach that addresses the demands and characteristics of each region. In the context of the 2030 Agenda, this is called the territorialization process of indicators. The fulfillment of the SDGs' 2030 Agenda in Marajó Island will only be possible if the territorial diversity of the Marajó Archipelago, including cultural, social, environmental, and economic practices, is included as an important and decisive factor in local development projects.

The effort to synthesize dimensions for analyzing the sustainability of cities in the context of the Marajó Mesoregion resulted in a synthesis framework of indicators that help understand urban sustainability within a context of urban diversity. Divided into five main dimensions, the fundamental role of interdisciplinarity in understanding subtle elements of the urbanization process could be observed. The final assembly of an indicator system requires further research to define sustainability parameters and collaboration with municipal governments in the Marajó Mesoregion and their associations to enable the regular collection of information not covered by official surveys. Our objective was to elucidate and propose interesting metrics that expand the view of urbanization in cities that are not fully converted to the urban-industrial model, where a close connection with nature and its cycles remains. However, we believe that the development of a system of urban sustainability indicators at the regional level could be a tangible outcome of the current proposal, and the individuals endorsing this text are available to engage in discussions with institutions interested in this matter.

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Ethics – This study does not involve human subjects and/or clinical trials that should be approved by the Institutional Ethics Committee.

Table 1 Summary of metrics for the composition of indicators to assess urban sustainability in the geographical context of the Marajó Mesoregion.

DIMENSION	SDG	PROPOSAL OF ADDITIONAL INDICATORS	JUSTIFICATIONS AND POSSIBILITIES
SOCIO-ENVIRONMENTAL	Goal 12: "Ensure sustainable consumption and production patterns." Goal 14: "Conserve and sustainably use the oceans, seas, and marine resources for sustainable development."	• Variables and types of land use and land occupation, classified by ecosystem type.	• Ensure the indication of the relationship between sustainable production and consumption patterns by considering the relationship between society and nature.
		• Mapping of the location of traditional community dwellings.	
		• Type and quantity of hazardous waste generated per capita.	• Reduce the complexities of spatial planning considering the social, cultural, and environmental peculiarities of the Marajó region.
		• Proportion of hazardous waste treated, classified by type of treatment.	• Include the human-nature relationship as determining factors of the spatial organization and dynamics of cities.
			• Include water quality as crucial for riverine cities and their residents.
SOCIO-ECONOMIC	Goal 8: "Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all."	• Number of formal and informal workers employed in activities related to socio-biodiversity product chains.	• Formal employment level assists families in accessing social security benefits, regular income, and credit systems (through the use of social currency).
		• Socioeconomic information per household (Number of people with access to benefits, Number of literate responsible individuals).	• The economic exploitation of Amazonian biodiversity can be seen as one of the means of articulation between rural and urban areas.
		• Percentage of own municipal tax revenues.	• The possibility of providing credit for individuals and businesses.
		• Percentage of companies in the municipality that produce or sell products related to local biodiversity.	• The potential to boost tourism and generate employment and income.
		• Strategies focused on sustainable or community-based tourism.	
		• Number of community banks (local social currency).	

Table 1 Summary of metrics for the composition of indicators to assess urban sustainability in the geographical context of the Marajó Mesoregion (*continuation*).

DIMENSION	SDG	PROPOSAL OF ADDITIONAL INDICATORS	JUSTIFICATIONS AND POSSIBILITIES
TERRITORIAL MANAGEMENT	Goal 6: "Ensure availability and sustainable management of water and sanitation for all."	• Rate of unplanned occupation in peri-urban areas.	• Ensure the importance of regional dynamics.
	Goal 7: "Ensure access to affordable, reliable, sustainable, and modern energy for all."	• Rate of occupation in irregular, unsafe, and disorderly areas.	• Ensure the specific urban characteristics to enable the implementation of adequate urban infrastructure policies for urban diversity.
	Goal 9.1: "Develop quality, reliable, sustainable, and resilient infrastructure, including regional and cross-border infrastructure, to support economic development and human well-being, with a focus on equitable access and affordable prices for all."	• Number of households connected to the general sewage system, treated water, and waste collection.	• Propose urban and regional planning methodologies that are sensitive to the geographic reality of cities in the Marajó Island.
	Goal 11: "Make cities and human settlements inclusive, safe, resilient, and sustainable."	• Commuting mobility based on microdata from IBGE (profile of residents engaged in commuting flows: study and work).	• Ensure quality and safe river transportation and its importance in various territorial contexts.
	Goal 11.2: "By 2030, provide access to safe, affordable, accessible, and sustainable transport systems for all."		

Table 1 Summary of metrics for the composition of indicators to assess urban sustainability in the geographical context of the Marajó Mesoregion (*continuation*).

DIMENSION	SDG	PROPOSAL OF ADDITIONAL INDICATORS	JUSTIFICATIONS AND POSSIBILITIES
EDUCATION FOR SUSTAINABILITY	Goal 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all."	• Number of schools where interdisciplinary proposals in environmental education are included as a cross-cutting theme in the curriculum.	• Ensure interdisciplinary subjects related to environmental education.
		• Partnerships between schools and communities regarding environmental education.	• Increase partnership between schools and communities in promoting environmental awareness.
		• Financial support for the development of projects for schools and environmental education.	• Include residents' perception as a fundamental aspect in the development of environmental education proposals and methodologies.
		• Residents' perception of the space they inhabit	
SOCIAL ORGANIZATION	Goal 16.7: "Ensure responsive, inclusive, participatory, and representative decision-making at all levels."	• Rate of social participation in decision-making processes.	• Increase social participation in decision-making processes.
		• Financial sustainability profile of organizations.	• Ensure initiatives to strengthen and support regional civil society organizations.
		• Number of initiatives to strengthen and support regional civil society organizations.	• Ensure greater participation of riverine and quilombola communities in leadership roles within organizations and decision-making processes.
		• Number of riverine and quilombola residents participating in organizational leadership. • Number of women in leadership positions in organizations.	• Promote the participation of women in leadership positions within organizations

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About the authors

Camila Amaral Pereira is an Economist who graduated from the Federal University of Ouro Preto (UFOP), with a Master's degree in Economic Development from the Federal University of Campinas (UNICAMP) and a PhD in Economic History from the University of São Paulo (USP). She is currently a researcher at the Institute for Applied Economic Research (IPEA). <https://orcid.org/0000-0003-0035-6536>

Heloísa Corrêa Pereira holds a degree in Tourism from the Federal University of Amazonas (UFAM), a master's degree in Environmental Sciences and Sustainability in the Amazon from UFAM, and a PhD in Demography from the State University of Campinas (UNICAMP). She is currently a full researcher at the Mamirauá Sustainable Development Institute (OS/MCTI). <https://orcid.org/0000-0002-2088-518X>

Juan Carlos Amilibia Gómez is a Biologist from the Universidad Central de Venezuela (UCV), with a master's degree in Ecology UCV. He is currently a specialist in the NGO Amazonia program of Provita. <https://orcid.org/0000-0001-8265-5614>

Monique Bruna Silva do Carmo is a Geographer who graduated from the University of Vale Paraíba (UNIVAP), with a Master's and PhD in Urban and Regional Planning from UNIVAP. She is currently a postdoctoral researcher at the National Institute for Space Research (INPE) and an associate researcher at the Center for the Analysis of Social-Ecological Landscapes (CASEL - Indiana University) and the Laboratory for the Study of Cities at UNIVAP. <https://orcid.org/0000-0003-2743-5883>

Paula Regina Humbelino de Melo has a degree in Sciences: Biology and Chemistry from the Federal University of Amazonas (UFAM), has a Master's degree in Science and Humanities Teaching at UFAM, and is a PhD student in Science Education at the Federal University of Rio Grande do Sul (UFRGS). She is currently a professor at the Federal University of Amazonas (UFAM). <https://orcid.org/0000-0002-0560-2938>

Renata Maciel Ribeiro obtained a Bachelor's degree in Environmental Sciences from the Fluminense Federal University (UFF), a master's degree in Remote Sensing from the National Institute for Space Research (INPE), and is a doctoral student in the Earth System Science program at INPE. She is currently an associate researcher at the Socio-environmental Systems Research Laboratory at INPE. <https://orcid.org/0000-0003-3081-4446>

Welbson do Vale Madeira is an Economist from the Federal University of Maranhão, with a master's degree in Economics from the São Paulo State University (UNESP), a PhD in Socio-environmental Development from the Federal University of Pará (UFPA) and a Post-Doctorate in Political Economy from the Fluminense Federal University (UFF). He is currently a professor in the Department of Economics and the Graduate Program in Socioeconomic Development at the Federal University of Maranhão (UFMA). <https://orcid.org/0000-0003-0958-8894>