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Sustainable urbanism and urban form: articulations and perspectives

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ABSTRACT

Urban space has been a scene of numerous political, social, and technological transformations during the last two centuries. As a result of an intense process of population and territorial growth of cities, urban fabrics around the world are marked by socio-spatial conflicts, which puts them in a particular urban crisis. As an opposing view, the concept of sustainable urbanism arises, resignifying the paradigmatic urban problems. However, it is a concept of complex definition, both theoretical and, mainly, practical. With the problem based on the development of the praxis of sustainable urbanism, this article aims to discuss aspects of urban form that contribute to the applicability of sustainable urbanism. The paper uses an exploratory methodology as to its objectives and follows a bibliographical research model as to its design. Due to the association proposed, the results indicate the combination of the following morphological principles in the city as desirable elements for urban sustainability: multifunctionality, compactness, connectivity, diversity, access to nature, and definition. The combination of these principles leads to the self-sustainability of the urban space. The article has the potential to contribute to researchers and practitioners scientifically and to assist in the implementation of sustainable cities.

KEYWORDS: Sustainable urbanism. Sustainability. Urban form.

1. INTRODUCTION

Urbanization is one of humanity's most significant events. Many of history's civilizational milestones have been related to urban centers: the written word, set in early city-states such as Mesopotamia; Gutenberg's printing press in Mainz, Germany; and the World Wide Web in some North American laboratories. In general, the city was especially crucial during the Industrial Revolution, which reshaped space as it was known. According to Rolnik (1995), primarily, cities are magnets, attracting people, goods, events, and happenings even before they were established as a space for living and working, as they are traditionally known.

Moreover, urbanization is one of the most transformative trends on the planet. It is inevitable to say that the world population is continuously becoming more urban. This happens in growth patterns of cities that are larger in area. Along with the social and technological transformations that have occurred mainly in the last two centuries, these patterns bring several characteristics to urban space, such as its growing role in waste production, its use of natural resources, and its environmental impact generation. Still, in most cities, these patterns result in the establishment of socio-spatially conflicting cities.

In opposition to this, sustainable urbanism has emerged, bringing new insights into what is considered urban space and proposing a new way for the city to be built. Besides a required theoretical deepening, the subject demands considerable practical deepening due to the excessive use of the theme in slogans and marketing labels worldwide. In urbanism applied in recent years, few concepts have been more quoted than the one of sustainability, but this may show a more conceptual inaccuracy than an accurate search for sustainable urban models.

In that sense, the problem of this article is found in the deepening of the praxis of sustainability concerning urbanism. Its objective is to discuss aspects of urban form contributing to urban sustainability's tangibility or applicability. To do so, the article begins with identifying the roots and the concepts of sustainability, followed by the situation of the urban problem and its relationship with the concept of sustainable urbanism. Finally, it reaches the articulation of this concept with urban form conceptions.

As to its objectives, the applied methodology is exploratory. As for its outline, it follows a bibliographical research model. Its studies were carried out first in printed

publications relevant to urbanism, sustainability, sustainable urbanism, and urban morphology. These studies were carried out through the Google Scholar, Science Direct, and Scielo platforms, using sustainability, sustainable urbanism, and urban morphology. These bibliographical studies took place between 2017 and 2021.

2. SUSTAINABILITY: FROM ITS ROOTS TO DEVELOPMENT

Transgressive processes have characterized the relations between man and nature since the dawn of humanity. These processes have been characterized by constant disruptions that were subtle at first. However, these disruptions have become increasingly severe, especially with population growth and increased demand for natural resources. Considering the advance of human practices in history, Santos (1992) argues that when humans moved to a globalized economy, they used a unique logic to consider nature: a reason characterized by a complete disregard for the particularities that each environment or natural space has. Based on this, mechanization of the planet was carried out, emphasizing man's domination of technology. This factor has made man a geomorphological and climatic agent since, due to his lifestyle, his actions in nature started to produce continuous and cumulative effects (SANTOS, 1992). The potential destruction of nature characterizes such effects.

This destructive potential was lower before the Industrial Revolution. According to Veiga (2015), between the emergence of agriculture, about 10,000 BC, and the mid-eighteenth century, the growth of human communities' production matched the growth of their population, leading to stable productivity and extensive growth of these communities in this period. During this period, and even before this, in a very general way, the various human groups on the planet made nature their space, their surroundings, to take from it everything and only what they needed to live, each in their way, but all in a relatively respectful way. Such practices, which relate to a holistic world and refer to a partnership between man, air, water, earth, and other living beings, have been for centuries embedded in various cultures and traditions, such as the Hawaiian, African, and indigenous ones. Indeed, traditional wisdom has much to offer in terms of living in harmony with nature and society, which is one of the fundamental principles of sustainability (MEBRATU, 1998). Therefore, these practices can be considered the beginning of the sustainability concept.

According to Grober (2007), such a concept was first explored in a systematized way in the 18th century from the semantic modification of the German term *nachhaltig*, or sustained yield, which has had much importance in silviculture over the past three centuries. It was coined in 1713 in the publication of the book *Sylvicultura oeconomica* by the then mining administrator Hans Carl von Carlowitz, who wrote about methods of predicting timber shortages, the primary natural resource of the economy at the time. Carlowitz criticized the immediatist way in which man viewed the prevailing economic models. According to him, the ordinary person could not see the benefits of cultivating something whose life cycle was longer than his own life. Moreover, the lack of care for the forests was common, based on the assumption that wood was an inexhaustible resource. Based on this, Carlowitz pointed out that a balance between reforestation and deforestation should be considered so that the wood from the study region could be used in posterity. In his publication, Carlowitz quotes the

words *nachhaltend* and *nachhaltig*, sustained and sustainable, respectively, used for the first time within the modern concept of sustainability: a necessity to be fulfilled so that something is maintained for future generations (GROBER, 2007).

Since the Industrial Revolution, man's destructive potential has shifted from local to national and international scales. Population growth and increased consumption, in addition to the quick use of crucial resources such as wood, coal, and oil, raised awareness about the necessity of intelligent resource use (DU PISANI, 2007). One of the leading theorists who addressed the idea of the possible finitude of natural resources at the time was Thomas Robert Malthus, one of the first to consider the limits of world growth because of this potential shortage. Therefore, the idea of sustainability gains new light.

However, it was in the second half of the 20th century that sustainability, as a concept, was shaped. This started to happen after the two World Wars when several events related to global awareness about how humanity treated nature took place. Some of these events are the publication of works questioning predatory progress in the 1960s and 1970s, such as Silent Spring by Rachel Carson, Blueprint for Survival by Goldsmith, Limits to Growth by Meadows et al., and Small is Beautiful by Schumacher; the release of the Gaia Theory in 1972 by James Lovelock, which paved the way for future discussions about deep ecology and the systemic world view (CAPRA, 1996); the emergence of governmental and non-governmental groups and organizations interested in fighting for nature protection; the emergence of private sector managers enthusiastic about producing products following policies to reduce pollution, decrease energy expenses, and efficiency in the use of materials; etc. These events highlight thought patterns that begin to be discussed by a small group of people but then become a widespread and capillary multisectoral movement: environmentalism (DU PLESSIS, 2012)

Within the environmental movement, two strands stand out worldwide during the 1970s: the catastrophist and the gradualist. Following a neo-Malthusian ideology, the catastrophist side is mainly represented by the group of researchers and scientists ‘Club of Rome’. They advocated the urgent revision of human behavior, reproduced in the immediate freezing of demographic and economic growth. For them, the world would collapse if the zero-growth policy were not adopted. If it hadn't already. The gradualist approach is shown by the reflections resulting from the 1972 United Nations Conference on the Human Environment, the Stockholm Conference, and the preparatory meetings that preceded it. As opposed to the proposal of zero growth, this approach promoted the concept of smart growth, capable of attending to the economic sphere and, at the same time, taking the environment into account. Based on what was discussed at the Stockholm Conference on development, the economist Ignacy Sachs (1978) coined the term "ecodevelopment.” For the author, ecodevelopment aligns social and economic objectives with ecological concerns by thinking of future generations. Based on that idea, in 1978, the United Nations Environment Programme (UNEP) mentioned the term sustainable development in a report that, then, was used as a synonym for the ecodevelopment proposed by Sachs, raising social aspects to the same level of relevance as environmental aspects in the search for the development of nations. Thus, greatly influenced by the gradualist approach to environmentalism, sustainable development is placed within a logic of equitable distribution instead of zero growth.

The concept of sustainable development emerged in the 1970s and became popular in the following decade. In 1983, UNEP created the World Commission on Environment and Development (WCDMA). As a result of this commission, in 1987, the document Our Common Future, or Brundtland Report, was published. It defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WSSD, 1991, p. 46). In summary, the document deepens this aspect of care for future generations within the logic of balance between economic factors and essential human aspirations, such as food, employment, energy, water, and sanitation.

It is possible to say that the Brundtland Report approaches sustainable development from a social rather than an environmental perspective. An example of this is how, in some passages, it is clear that the notion of nature is reduced to a simple resource supply for humankind. Even so, according to Mebratu (1998), it was after this report that sustainable development became a central element in global environmental discussions. For the author, it was in this circumstance that the delimitation of sustainability into three spheres - economic, ecological, and social –was pointed out by Sachs (1978) almost a decade before it was established. This delimitation guided the creation of the triple bottom line, or 3P's - profit, planet, and people - in the 1990s (ELKINGTON, 2008). Mebratu (1998) points out that this delimitation into three dimensions is flawed when each one is considered without integration with the others or when sustainability is seen as the intersection of these three points. Alternatively, the author argues that these spheres should be read in a state of cosmic interdependence. The meeting between them does not translate into sustainability but points to an inextricable form of coevolution toward sustainable development.

In the following decades, several meetings, conferences, and commissions continued to build the concept of sustainability at national and international levels. All this was within the developmentalist paradigm. Among them, we can highlight the following conferences: Rio 92, which produced Agenda 21, Rio +10, Rio +20, and, finally, the United Nations Summit on Sustainable Development, which launched the 2030 Agenda. In it, 17 goals were outlined for sustainable development (SDGs), subdivided into 169 targets to be achieved by 2030. The agenda is designed as a bold action plan to achieve results, such as poverty eradication, inequality reduction, quality education, health, and well-being for all. According to Veiga (2015), with the SDGs, the 2030 Agenda deepens and enhances the meaning of sustainable development. It goes beyond the three-dimensional definition and sets goals, which brings a certain tangibility. Although it still holds a particular abstraction, it is connected to the reality of the 21st century. It is essential to mention that the decade of 2020 was considered the "decade of action," a critical phase for the 2030 Agenda implementation (MENDOZA; TUSZEL; JARDIM, 2020).

About the relationship with the concept of sustainability itself, it is possible to say that sustainable development would be the path to sustainability in a connection between "means" and "end" (SARTORI; LATRÔNICO; CAMPOS, 2014). Nevertheless, it is essential to highlight that sustainability has an evolving aspect that applies differently to different social and environmental demands. It depends on the scientific and technological achievements of each generation, time, or people.

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3. UNSUSTAINABILITY AND URBANIZATION

About 56% of the world's population lives in urban areas. The accelerated population growth in cities worldwide caused the urban population to surpass the rural population for the first time in history in 2007. Urban populations have grown from approximately 750 million in 1950 to more than 4.2 billion in 2020. According to projections, by 2030, nearly 60% of the world's population will live in urban areas, and by 2050, it could reach two-thirds of the population (UNITED NATIONS, 2019). Mainly because they hold most of the world's population, cities greatly influence sustainability confirmation.

This statement is aggravated when it is considered that urban population growth has urban expansion in area as a consequence. Studies show that contemporary cities have followed a growth pattern that is even larger in size than in population (HAASE; KABISCH; HAASE, 2013; SETO et al., 2011) - twice as large, according to Angel et al. (2011). This relation between population and territorial growth has led to a decrease, over the years, in urban density around the world, increasing the sprawl of cities. According to Xu et al. (2020), declining urban density increases the demand for land. It raises the cost of infrastructure in the urbanization process, driving urban segregation and decreasing urban vitality. Low-density urban sprawl increases per capita resource use, pollution generation (FARR, 2013), and soil sealing (RICHARDS, 2013).

Since it happens unrestrainedly, this city population and territorial growth logic affect the consummation of what Maricato (2013) calls "urban crisis." The characteristics of this crisis are informal cities (slums and illegal subdivisions), socio-spatial inequality, the concentration of income, urban violence, and environmental predation from the air, water, and soil pollution. Although Maricato's (2013) studies apply to Brazil, these characteristics are found in several other cities worldwide, especially in developing countries. Another influential element of this urban crisis is capitalist logic, a product of neoliberal globalization. The urban space is understood not only as a shelter for commodities but also as a commodity itself. According to Maricato (2013), producing cities based on this logic causes about 90% of urban problems. This would be the commodified city that Rolnik herself (1995, p. 39) well characterized in the 1980s when she playfully narrated characteristic elements of the city: "urban land, which was communally occupied, becomes a commodity - which is bought and sold like many oxen, a shoe, a cart, or a handful of gold."

From this perspective, the urban crisis scenario should be considered first and foremost in the search for sustainable cities. However, the concept that intertwines the concepts of "city" and "sustainability" has been used in the speech of the "ecologically correct" by urban actors who seek to attract, for themselves, investments within intra-urban economic competitions. This practice results from the market logic of understanding the urban space. For Silva and Romero (2010), the longer urban discussions remain preferentially tied to investing companies and industries, the more extended societies will be disarticulated and with less participation in the city's decisions. In this sense, sustainability is jeopardized.

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4. SUSTAINABLE URBANISM

In opposition to the urban crisis paradigms and the city's marketing vision, the concept of sustainable urbanism arises based on the contemporary notion of sustainability, which proposes a new way of producing urban space. This concept has been widely used in the last decades. Although often misinterpreted, partly through a rhetorical discourse - urban marketing (ACSELRAD, 2009) - its real essence has much to contribute to discussions on the city's environmental quality and socio-spatial equity.

As seen in the history of the environmental movement and the construction of the concept of sustainable development, sustainability shows its roots in the awareness of the necessary protection of nature against human destruction. The urban environment went through a similar process in such a way that the antagonistic understanding between city and nature evolved to the knowledge of the urban as an environmental locus, which makes it the object of sustainability. According to Costa (2000), the distance between the paths of environmental and urban analysis has jeopardized the promotion of urban sustainability. Another harmful point is the conflict between theoretical formulations about the city and their translation into practice, distancing the critical discourse of social and urban analysis from the achievements of urban planning and design.

The paradigm that understands the city as opposed to nature was identified and unraveled in the 1980s by Spirn (1984). For the author, the relationship between the city and nature is a consequence of a complex interaction between the various humans and other living things and the natural processes that regulate this interaction, such as the water cycle, air movement, and land erosion. She argues that the city is part of nature and should be planned and built to integrate the existing ecosystem. This view is very much in line with the idea of deep ecology, developed in the 1970s, one of the products of the Environmental Movement that contributed to the emergence of the concept of sustainability. Deep ecology conceives the world as an integrated whole, where man is not above nature, nor the other way around: both are to be included in a scenario of fundamental interdependence of all phenomena. In this scenario, each element is attached to natural cyclical processes. This application of the term "ecology" is different from the usual one: it is applied in a more "profound" way by an ecological school created in the 1970s by the Norwegian Arne Næss. An "ecological" view, in this sense, is more comprehensive than a "holistic" view: the holistic view would conceive of an object as the whole and understand the interrelationship between its parts, while the ecological perspective, besides doing that, would consider the relationship of this object with its natural and social environment (CAPRA, 1996).

The ecological interdependence between the city, its material base, society, and nature is the guiding principle of sustainable urbanism. This logic indicates that future generations, not only human ones, have the same rights as the current ones. For Acselrad (2009), the sustainable urbanism discourse should be linked to the reproduction of the city by a society based on the future. In this sense, urban understanding space as a product of its society, sustainable urban development seeks to unveil conditions for the duration of cities. Thus, the concept of sustainable urbanism is based on two axes. The first meets an environmental base, which favors efficiency in transforming energy into work, understanding

the city as an ecosystem where there is an exchange and circulation of resources that should happen in a circular metabolism, not in a linear way. The precepts of waste recycling, development of local flows, and economy of resources, energy, and space are emphasized. This axis has the city's values of balance and resilience as its key. The second axis starts from a social base. By questioning the urban technical bases based on citizenship and preserving the urban and communitarian patrimony, it reaches efficiency in democratization and social-spatial equality. In this way, it indicates that everyone has the same right to the city and must have the same access to it.

In essence, urban sustainability, as a concept, and sustainable urbanism, as a collection of knowledge and techniques, represent a systemic relationship between economic, social, and environmental elements when thinking about the city, which can be branched into several others. That said, it is essential to highlight that sustainable urbanism is evolutive, like the notion of sustainability. It is in "constant adjustment and adequacy to human needs, resulting from experiments, experiences, research, and interactions of sociocultural, economic, environmental, and technological phenomena" (SILVA; ROMERO, 2010, p. 2).

5. CORRELATIONS BETWEEN URBAN FORM AND SUSTAINABLE URBANISM

Urban form is the spatial configuration of physical elements that make up the urban environment. According to Moudon (1997), these elements are divided into three basic categories: buildings (and voids), land, and streets. Several aspects can be analyzed within these three main elements, but they can only be perceived historically since they constantly change over time. There is also the perception of four scales of analysis: the building and lot scale, the street and block scale, the city scale, and the regional scale.

In urban morphology - the study of urban form - it is crucial to consider the dialectics of urban space formation. In it, the physical elements that make up urban space influence and determine social relations while being influenced and determined by them. In this way, characteristics of social processes can be visualized in space just as space can influence social processes. For this reason, the urban form is not restricted to the city's materiality. In this materiality are contained the values of the social and historical processes that shape and are shaped by the physical part of the city. Urban morphology is, therefore, concerned with understanding the elements of physical urban space and the societal processes that are imprinted on these elements.

In recent decades, part of urban sustainability research has been based on the investigation of what is considered sustainable urban form to try to present morphological characteristics that determine the sustainability of urban space. However, we argue here that there is no sustainable urban form. Urban form is only one of the dimensions to be considered and put in evidence when dealing with the depth of urban sustainability. Even considering the social load that urban form intrinsically can carry, its physical nature essentially does not allow its association with the adjective "sustainable": to be sustainable is to be beyond form. Neuman (2005) points out that naming an urban form sustainable is comparable to calling a body sustainable - the proper relationship to be made does not concern the body's sustainability but whether the being inhabits that body and lives sustainably. In this sense, the

author argues that processes are more valuable than forms in a conception of urban sustainability.

However, it is essential to note that, as Acselrad (2009) points out, the notion of urban sustainability can be articulated in the argumentative strategies of urban morphology. This articulation of approach is highly relevant to the promotion of urban sustainability. Currently, the most prominent discourse of these strategies is that of compactness, or the compact city, which, according to Acselrad (2009), should bring together attributes of high density and mixed-use, being able to reduce distances, make the city more practicable for pedestrians and cyclists, maximize the supply of public transport and optimize its energy efficiency, promoting quality of life for its residents. Its most accepted formal configuration would be the polycentric network model, with sub-centers well provided with efficient public transportation and diversification of functions.

Costa (2000) indicates this same perspective, widely discussed by the Commission of the European Communities in the 1990s, which rightly points to the adoption of

> High-density compact cities are environmentally desirable since they reduce commuting and promote a better quality of life. To this end, the return of mixed uses in cities is proposed, and an end to extensive urban sprawl, such that new development occurs within existing urban limits. Associated with the containment of physical expansion is the idea of encouraging an innovative urban environment, rich in culture and leisure, in the tradition of European capitals. From a more technical point of view, the emphasis of the argument is on cost reduction and efficient use of energy and transport resources. This proposal clearly assumes that a compact urban form produces greater sustainability (COSTA, 2000, p. 65).

On this subject, Rogers and Gumuchdjian (2015) include that the monofunctional urban model, which even places the private car as the central element of the mobility system, moves in the opposite direction of urban sustainability. On the other hand, the compact city model intensifies the use of efficient transportation systems and balances the use of streets in favor of pedestrians and cyclists by reducing distances. Therefore, this model would be positive for the sustainability of the city. For the authors and Acselrad (2009), this urban compactness should be associated with a city model with multiple centralities articulated in a network. These centralities should represent nodal points of transportation - public and active - around which the community develops.

Farr (2013) includes that urban compactness results in increased per capita permeable land cover, increasing water and energy use efficiency. In addition, compactness can decrease the spatiality of pollution. The city of Chicago can be held up as an example that illustrates this point: the city's numbers show that pollution decreases as one moves from the denser downtown to the more dispersed rural areas. Still, they also show that when the total amount of pollution generated in these areas is divided per person, it is less in the downtown area. Following this logic, the more people leave dispersed urban fabrics and go to compact ones; the less pollution will be produced in total. Also, the author states that compactness integrates the city's infrastructure more efficiently, reducing costs.

Entretanto, é importante ressaltar o argumento de Van Der Waals (2000): os efeitos positivos da urbanização compacta em uma determinada área dependem fortemente da sociedade dessa área e de suas políticas públicas. A compacidade, por si só, pode não ser

capaz de apresentar resultados nos cenários e objetivos elencados para a cidade. Para que a compacidade faça sentido na articulação entre morfologia urbana e sustentabilidade, pelo menos outros quatro atributos são significativos: diversidade, definição, conectividade e acesso à natureza (FARR, 2013).

The urban diversity attribute supported by Farr (2013) is the one that promotes a mix of urban land uses and opposes the rigid zoning model, which is intensely used in modern-functionalist cities. For the author, the effects of diversity are also associated with reducing distance since the variety of uses tends to meet the daily needs of the inhabitants of a given neighborhood. People start to have the bakery, the restaurant, the pharmacy, the supermarket, and even the hospital and the school close to their homes. Combined with a well-executed urban design, diversity encourages people to carry out their activities on foot or by bicycle. For Cavion (2011, p. 4), "diversity also refers to the typological variety of housing to accommodate people and families with different lifestyles, allowing them to remain in the neighborhood even when their needs change." Still, as Gehl (2015) illustrates, the diverse city or neighborhood stimulates the consolidation of space with urban vitality, besides instigating respect for the human scale.

The attribute definition also refers to the polycentricity notes of Acselrad (2009) and Rogers and Gumuchdjian (2015). Farr (2013) argues that these sub-centers should be multiple and well-defined, efficiently connected by a public transportation network. According to the author, this element brings sociability benefits among the residents of a given neighborhood, contributing to the consolidation of a sense of community and encouraging a behavior change since it stimulates activities within the district, as well as promoting its residents to take responsibility for its maintenance and evolution. This idea traces back to the cellular nature of Howard's garden cities. "The well-defined sustainable neighborhood is the physical manifestation of the phrase popularized by environmentalist David Brower: 'Think globally, act locally'" (FARR, 2013, p. 30).

These three attributes presented - compactness, diversity, and definition - converge to the point that, in Brazil, is explored by Netto (2008). The author points out two concepts that, due to conceptual similarity, can be considered consequences of the three attributes presented above: sociality and microeconomics. Sociality represents the vitality of communications, encounters, and social relations within a given neighborhood or city. It comprises the "social relations generated by different spatial configurations, including the density of social networks, the possibility of meeting, and the degree of social appropriation in our spaces as a problem linked to the configuration of our streets, blocks, and building" (NETTO, 2008, p. 5). It has an active spatial dimension, ranging from the implantation of the building to the effects that a portion of the city will have on the security of that region. Microeconomics is also determined in different ways but is related to a section of a neighborhood's ability to support that neighborhood's microeconomic activity and respond to the potential for exchange within it. This concerns the scope of commercial and service relationships and is proportional to the density and location of the area within the urban system. It refers to the participation of built units in providing activities that serve daily life in the neighborhood or city.

Following the conceptualization of the previously mentioned attributes, for Farr (2013) and Rogers and Gumuchdjian (2015), the connectivity attribute indicates the neighborhood or city's need to link and provide different transportation modes to facilitate mobility and accessibility within it and with other neighborhoods and cities. The item aims to provide better public transportation systems consistent with the densities and land uses in the areas served. Bicycle and walking facilities should be integrated into these systems. According to Wall and Waterman (2012), urban form is considerably influenced by the types of transportation it offers and should favor pedestrian-oriented modes. Gehl (2015) states that bicycling expends 60 times less than a car in terms of energy consumption, and walking is 20 times less. Furthermore, bicycle and pedestrian traffic do not crowd city space as car traffic does, demanding far more basic spatial needs. While a two-way street supports between 1,000 and 2,000 cars per hour at peak hours, a 7-meter wide pedestrian lane can accommodate 20,000 people per hour, and at that same time, two 2-meter wide bike lanes are sufficient for 10,000 cyclists (GEHL, 2015).

Finally, the attribute access to nature is placed, in an ecological sense, as the maintenance of nature as a component of the urban environment. Morphologically, neighborhoods should promote and facilitate this integration, as it contributes to the health of its residents since greener and wooded environments tend to provide fresh air and protection against direct sun exposure. In addition, the existence of tree clumps within the city promotes a decrease in heat islands and air renewal, as they decrease carbon dioxide levels and increase oxygen levels. Farr (2013) argues that people are three times more likely to walk when they know they will pass through wooded areas.

From these attributes, it is possible to visualize that their intersection would generate an urban form of human settlements capable of expressing self-sufficiency. As Acselrad (2009, p. 61) puts it, urban self-sufficiency, besides combating the greenhouse effect and the negative impacts of anthropic processes, is oriented to greater energy and economic autonomy of localities within a city. The central articulation between urban form and sustainable urbanism is perhaps related to the search for models oriented towards self-sufficiency.

However, it is essential to state that the relationship between sustainability and the attributes presented here - especially compactness - is not consensual in scientific and academic circles. Robertson (1990), for example, indicates that dispersed and non-polycentric urban fabrics can be more energy efficient and promote a higher quality of life for the population. According to the author, this occurs because they rely on local energy and food production sources based on the greater availability of arable land. Furthermore, Lyn and Yang (2006) argue that high-density and mixed-use patterns can positively affect the economic sphere of sustainability but not necessarily the social and environmental spheres. The purpose of this paper is not to prove one thing or another, whether higher compactness is more efficient or less efficient for sustainability, or even whether the arrangement of defined and connected centers is more or less appropriate. The intention is to show the construction of the sustainable urbanism discourse through urban morphology. In this sense, there is a need for more studies and research in this area so that sustainable urbanism can be used as a problematic and examination questions with greater propriety and applicability can be genuinely unveiled.

6. FINAL CONSIDERATIONS

The essence of sustainability goes back to traditional practices of people who assimilated a "harmony" between man and nature. From its roots, this concept is traced back to the post-Industrial Revolution and, mainly, in the 20th century through "sustainable development." It emerged due to environmentalist discussions that sought to re-signify what was understood as societal growth and progress. Therefore, from the man-nature harmony, sustainable development shows itself in the society-economy-environment balance in an inseparable way, thinking about the future generations and the evolutionary aspect.

Considering that cities are among the human constructions that most impact the planet, the urban environment is one of the most pertinent objects of study for sustainability. Most of the world's population lives in cities. This urban portion of the population has grown substantially over the years, which has caused cities to grow in area. Since it happens straightforwardly in some places, this expansion adds to socio-spatial problems, culminating in an urban crisis.

Proposing a form of a city's enduring in a context of socio-spatial quality, sustainable urbanism emerges with an urban ecological vision - the city as an integrated and systemic whole - and the notion of evolution and adaptability to new realities that are constantly emerging. The concept has two main axes, social and environmental, articulated in several values: recycling, balance, resilience, equality, and maintenance of the citizen's right to the city.

The deepening of the association of sustainable urbanism values with the physicality of the city - the urban form - indicates the combination of principles, such as multifunctionality, compactness, valorization of active transportation - on foot or by bicycle -, diversity, access to nature, and the arrangement of well defined and connected urban centers. It is essential to mention that this association respects the profound aspect of the idea of sustainability and understands that, for this concept, the urban processes compete for more than their form.

However, considering the objective of discussing the "practice" of sustainable urbanism, or its applicability, we understand that articulating this concept and urban morphology strategies is suitable. This discussion already moves towards this practice by itself: looking at cities through parameters that consider this logic contributes to its applicability. Thus, this article is placed as an initial substrate for the great discussion of sustainable urbanism and the search for its features in the configuration of cities. It is possible to say that the study presented here contributes scientifically to researchers who study the urban and professionals who have it as a work object. Thus, the article could contribute to the formation of increasingly sustainable cities.

BIBLIOGRAPHY

ACSELRAD, Henri. Sentidos da sustentabilidade urbana. *In*: ACSELRAD, Henri (org.). **A duração das cidades:** sustentabilidade e risco nas políticas urbanas. 2. ed. Rio de Janeiro: Lamparina, 2009. p. 43–70.

ANGEL, Shlomo *et al.* The dimensions of global urban expansion: Estimates and projections for all countries, 2000–2050. **Progress in Planning**, [*s. l.*], v. 75, n. 2, p. 53–107, 2011. DOI: https://doi.org/10.1016/j.progress.2011.04.001. Disponível em: https://linkinghub.elsevier.com/retrieve/pii/S0305900611000109. Acesso em: 6 jan. 2021.

CAPRA, Fritjof. **A teia da vida:** uma nova compreensão científica dos sistemas vivos. 11. ed. São Paulo: Cultrix, 1996.

CAVION, Renata. Proposta de modelo sistêmico para a elaboração de diagnóstico de sustentabilidade urbana. *In*: ENCONTRO NACIONAL DA ANPUR, 2011, Rio de Janeiro. **Anais [...]**. Rio de Janeiro: ANPUR, 2011. Disponível em: http://anais.anpur.org.br/index.php/anaisenanpur/article/view/899/882. Acesso em: 29 ago. 2019.

CMMAD. **Nosso Futuro Comum**. 2. ed. Rio de Janeiro: Fundação Getúlio Vargas, 1991.

COSTA, Heloisa Soares de Moura. Desenvolvimento urbano sustentável: uma contradição de termos?. **Revista Brasileira de Estudos Urbanos e Regionais**, [*s. l.*], n. 2, p. 55–71, 2000. DOI: https://doi.org/10.22296/2317-1529.2000n2p55. Disponível em: http://rbeur.anpur.org.br/rbeur/article/view/37. Acesso em: 1 out. 2020.

DU PISANI, Jacobus A. Sustainable development – historical roots of the concept. **Environmental Sciences**, [*s. l.*], v. 3, n. 2, p. 83–96, 2007. DOI: https://doi.org/10.1080/15693430600688831. Disponível em: http://www.tandfonline.com/doi/abs/10.1080/15693430600688831. Acesso em: 3 jun. 2020.

DU PLESSIS, Chrisna. Towards a regenerative paradigm for the built environment. **Building Research & Information**, [*s. l.*], v. 40, n. 1, p. 7–22, 2012. DOI: https://doi.org/10.1080/09613218.2012.628548. Disponível em: http://www.tandfonline.com/doi/abs/10.1080/09613218.2012.628548. Acesso em: 5 maio 2020.

ELKINGTON, John. The triple bottom line: Sustainability's Accountants. *In*: RUSSO, Michael V. **Environmental Management:** Readings and Cases. 2. ed. Los Angeles; London; New Delhi; Singapore: Sage Publications, 2008.

FARR, Douglas. **Urbanismo sustentável:** desenho urbano com a natureza. Tradução: Alexandre Salvaterra. Porto Alegre: Bookman, 2013.

GEHL, Jan. **Cidades para pessoas**. Tradução: Anita Di Marco. 3. ed. São Paulo: Perspectiva, 2015.

GROBER, Ulrich. **Deep roots:** A conceptual history of "sustainable development" (Nachhaltigkeit). Berlin: WZB Discussion Paper, 2007. *E-book*. Disponível em: https://bibliothek.wzb.eu/aDISWeb/app?service=direct/0/Home/$DirectLink&sp=SOPAC&sp=SEN&sp=SAK00170237. Acesso em: 3 jul. 2020.

HAASE, Dagmar; KABISCH, Nadja; HAASE, Annegret. Endless Urban Growth? On the Mismatch of Population, Household and Urban Land Area Growth and Its Effects on the Urban Debate. **Plos One**, [*s. l.*], v. 8, n. 6, p. 1–8, 2013. DOI: https://doi.org/10.1371/journal.pone.0066531. Disponível em: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0066531. Acesso em: 6 jan. 2021.

LIN, Jen-Jia; YANG, An-Tsei. Does the Compact-City Paradigm Foster Sustainability? An Empirical Study in Taiwan. **Environment and Planning B:** Planning and Design, [s. l.], v. 33, n. 3, p. 365–380, 2006. DOI: https://doi.org/10.1068/b31174. Disponível em: http://journals.sagepub.com/doi/10.1068/b31174. Acesso em: 21 jan. 2021.

MARICATO, Ermínia. **Brasil, cidades:** alternativas para a crise urbana. 7. ed. Petrópolis: Editora Vozes, 2013.

MEBRATU, Desta. Sustainability and sustainable development. **Environmental Impact Assessment Review**, [*s. l.*], v. 18, n. 6, p. 493–520, 1998. DOI: https://doi.org/10.1016/S0195-9255(98)00019-5. Disponível em: https://linkinghub.elsevier.com/retrieve/pii/S0195925598000195. Acesso em: 3 jun. 2020.

MENDOZA, Beatriz González; TUSZEL, Luciana; JARDIM, Luiza. **Consulta Cidades Sustentáveis:** Relatório de resultados da segunda edição, com a percepção de mais de 10.000 brasileiros sobre como está a sustentabilidade na sua cidade. [*S. l.*]: Colab; ONU-Habitat, 2020. *E-book*. Disponível em: https://pages.colab.re/cidades-sustentaveis-livro-ed2?fbclid=IwAR0e7GcBs79SYLy-LRBRNABtAMzL4ArL7vvI0NsR9CR1lxHpYd-7Q0l-LpE. Acesso em: 25 nov. 2020.

MOUDON, Anne Vernez. Urban morphology as an emerging interdisciplinary field. **Urban Morphology**, [*s. l.*], v. 1, p. 3–10, 1997. Disponível em: http://www.urbanform.org/online_public/1997_1.shtml. Acesso em: 16 jun. 2021.

NETTO, Vinicius de Moraes. Morfologias para uma sustentabilidade arquitetônico-urbana. *In*: SEMINÁRIO INTERNACIONAL DO NUTAU, 2008, São Paulo. **Anais [...]**. São Paulo: NUTAU, 2008. p. 1–14. Disponível em: https://www.usp.br/nutau/CD/trabalhos.html. Acesso em: 21 jan. 2021.

NEUMAN, Michael. The Compact City Fallacy. **Journal of Planning Education and Research**, [*s. l.*], v. 25, p. 11–26, 2005. DOI: https://doi.org/10.1177/0739456X04270466. Disponível em: https://journals.sagepub.com/doi/10.1177/0739456X04270466. Acesso em: 13 set. 2021.

RICHARDS, Lynn. A água e o debate da densidade. *In*: FARR, Douglas. **Urbanismo sustentável:** desenho urbano com a natureza. Tradução: Alexandre Salvaterra. Porto Alegre: Bookman, 2013. p. 100–104.

ROBERTSON, James. Alternative futures for cities. *In*: CADMAN, David; PAYNE, Geoffrey (ed.). **The Living City:** Towards a Sustainable Future. 2. ed. London: Routledge, 1990. *E-book*. Disponível em: https://www.taylorfrancis.com/books/living-city-david-cadman-geoffrey-payne/e/10.4324/9780429197307?refId=46ba56ed-d408-4178-9a1f-713b1eb21a8f. Acesso em: 21 jan. 2021.

ROGERS, Richard; GUMUCHDJIAN, Philip. **Cidades para um pequeno planeta**. Tradução: Anita Regina Di Marco. São Paulo: Gustavo Gili, 2015.

ROLNIK, Raquel. **O que é cidade**. São Paulo: Brasiliense, 1995.

SACHS, Ignacy. The salient features of development. *In*: FRANCIS, George R. (org.). **Environment and Development:** Phase III. Ottawa: Canadian International Development Agency, 1978.

SANTOS, Milton. 1992: a redescoberta da Natureza. **Estudos Avançados**, São Paulo, v. 6, n. 14, p. 95–106, 1992. DOI: https://doi.org/10.1590/S0103-40141992000100007. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-40141992000100007&lng=pt&tlng=pt. Acesso em: 15 ago. 2020.

SARTORI, Simone; LATRÔNICO, Fernanda; CAMPOS, Lucila M. S. Sustentabilidade e desenvolvimento sustentável: uma taxonomia no campo da literatura. **Ambiente & Sociedade**, [*s. l.*], v. 17, n. 1, p. 1–22, 2014. DOI: https://doi.org/10.1590/1809-44220003490. Disponível em: https://www.scielo.br/scielo.php?script=sci_abstract&pid=S1414-753X2014000100002&lng=pt&nrm=iso&tlng=pt. Acesso em: 12 ago. 2020.

SETO, Karen C. *et al.* A Meta-Analysis of Global Urban Land Expansion. **Plos One**, [*s. l.*], v. 6, n. 8, p. 1–9, 2011. DOI: https://doi.org/10.1371/journal.pone.0023777. Disponível em: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0023777. Acesso em: 6 jan. 2021.

SILVA, Geovany Jesse Alexandre da; ROMERO, Marta Adriana Bustos. Novos paradigmas do urbanismo sustentável no Brasil: a revisão de conceitos urbanos para o século XXI. *In*: CONGRESSO LUSO-BRASILEIRO PARA O PLANEJAMENTO URBANO, REGIONAL, INTEGRADO E SUSTENTÁVEL, 2010, Faro. **Anais [...]**. Faro: PLURIS, 2010. p. 216. Disponível em: http://pluris2010.civil.uminho.pt/congresso_actas_ID.html. Acesso em: 1 abr. 2020.

SPIRN, Anne Whiston. **The granite Garden:** urban nature and human design. New York: Basic Books, 1984.

UNITED NATIONS. **World urbanization prospects:** the 2018 revision. New York: Department of Economic and Social Affairs; Population Division, 2019. *E-book*. Disponível em: https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf. Acesso em: 24 ago. 2020.

VAN DER WAALS, Jochem F. M. The compact city and the environment: a review. **Tijdschrift voor Economische en Sociale Geografie**, [*s. l.*], v. 91, n. 2, p. 111–121, 2000. DOI: https://doi.org/10.1111/1467-9663.00099. Disponível em: https://onlinelibrary.wiley.com/doi/pdf/10.1111/1467-9663.00099. Acesso em: 6 maio 2020.

VEIGA, José Eli da. **Para entender o desenvolvimento sustentável**. São Paulo: Editora 34, 2015.

WALL, Ed; WATERMAN, Tim. **Desenho urbano:** fundamentos do paisagismo. Tradução: Alexandre Salvaterra. Porto Alegre: Bookman, 2012.

XU, Gang *et al.* Compact Urban Form and Expansion Pattern Slow Down the Decline in Urban Densities: A Global Perspective. **Land Use Policy**, [*s. l.*], v. 94, p. 104563, 2020. DOI: https://doi.org/10.1016/j.landusepol.2020.104563. Disponível em: https://linkinghub.elsevier.com/retrieve/pii/S0264837719301723. Acesso em: 6 jan. 2021.