

**The importance of green areas and public spaces for  
the urban climate and human well-being**

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## SUMMARY

The process of urbanization and formation of cities does not contribute with tools to minimize climate impacts and urban comfort. The disorderly growth and lack of planning had negative consequences on the environment quality and the well-being of its inhabitants. Reflections and studies have demonstrated the improvement of the environmental quality also come from the green areas, a primordial element in the search for development with new planning practices. This work aims to analyze the literature on the influence of green areas and public open spaces on the environmental and climatological quality of cities, supporting urban microclimate and social well-being. As a methodological basis, a literature review was developed, which included books, articles, theses, and dissertations. After, it was analyzed how the urbanization process of cities and inadequate urban planning directly reflect on environmental comfort. Furthermore, to build an information base about the theme, the investigation of the contributions of green areas and public open spaces in this context was discussed. According to the results found, urban vegetation plays a fundamental role in a healthier built environment for all, and with that, the work helps in future research, and theoretical debates through the realization of this review and contributes to urban landscape projects.

**KEY WORDS:** Urban planning. Green areas. Urban climate.

## 1. INTRODUCTION

Changes in climate and urban comfort are directly associated with the urbanization process and the lack of city planning, directly impacting on the quality of the environment and the well-being of its inhabitants. According to Lefebvre (2001), the urban problematic begins with the process of industrialization, a segment that boosted transformation in society. But, however, it generated the emergence of problems related to growth, city planning, and issues related to leisure and culture.

As previously mentioned, urban occupation in Brazil took place without proper planning. The industrial revolution favored the increase of the urban population in the cities, since the lack of job opportunities in the countryside caused the migration of rural workers searching for labor and new possibilities. This movement took place in Brazil with greater intensity in the mid-19th and 20th centuries, it became known as the rural exodus and resulted in population growth (PAULO, 2018).

Human beings are responsible for transforming cities, as Kevin Lynch reports:

Impersonal forces do not transform human clusters. Or they only do so on rare occasions of natural disaster: fires, floods, earthquakes and plagues. Otherwise, the modification of the population agglomeration is a human aspect, however complex, provoked by human causes, however obscure or ineffective. If we can uncover some of these causes, we can discover some important indications about the links between values and environmental form (LYNCH, 2015, p. 11).

Urbanization, deforestation, agricultural services, are examples of activities developed by man that can recklessly alter the climate. "Man's greatest impact on climate takes place in urban areas" (AYOADE, 1996, p. 300). In these areas, natural surfaces are altered by paved surfaces, causing an increase in temperature and a decrease in humidity.

According to Mira, Freire and Nakata (2015), in 1973, the psychoanalyst Erich Fromm used the expression biophilia for the first time in his book *"The Anatomy of Human Destructiveness"*, describing it as the love for life and for everything that is alive. Biologist

Edward Osborn Wilson, disseminated the concept in his work "*Biophilia*", explaining the intuitive and emotional relationship that humans have in reaction to nature. Through the publication of the Biophilia Hypothesis, by Kallert and Wilson (1993), the human need for connection with the natural environment is confirmed, providing physical and mental health and contributing to the well-being of society. Parks and squares with numerous green areas and urban equipment for capturing rainwater play an essential role in supporting biophilia and urban comfort (KAKOLA, 2013).

In agreement with Pilotto (2003), even though there is disorderly growth in most cities, it is necessary that the population can enjoy a healthy urban environment with environmental quality, these characteristics are also possible through green areas. They play a significant role as parameters in assessing the quality of life of the population and especially the quality of the environment.

Therefore, public open spaces benefit the quality of life of a neighborhood or city, as in addition to their green areas being extremely important for the lives of living beings, they promote connections and social gatherings. The availability of spaces for leisure, walking and physical exercise, help reduce sedentary lifestyle, which is one of many public health problems (GEHL, 2015).

Based on the addressed subject, the main objective is to study the influence of green areas and public open spaces on the environmental and climatological quality of cities, favoring the urban microclimate and social well-being. And, as a consequence, generate debates among professionals and students in the area, contributing to the improvement of urban climate comfort. And as specific objectives, the article aims to analyze studies on the development of urban planning in Brazilian cities; investigate the importance of green areas and public spaces in urban comfort; observe urban climatology and its influence on social well-being in cities; and contribute to future research regarding this content.

## 2. LITERATURE REVIEW

### 2.1 Disorderly urban planning

As highlighted by Monteiro and Mendonça (2003), the exacerbated and disorderly urbanization process, without planning according to the law, contributed to (caused) the need for studies based on urban formation in Brazil. However, the focus was given to economic and social aspects, and issues related to the environment were neglected and ignored.

Marked by expressive paradoxes, modernity registers both the intensification of nature degradation and the awakening of consciousness for rational or planned intervention in the alteration/construction of the urban environment. Once the inexorable condition of the urbanization of humanity has been verified, the planning or ordering of the development of urban spaces appears as a priority necessity and, for that, all the component elements of the biotic, abiotic and social environment should be taken into account (MONTEIRO; MENDONÇA, 2003, p. 177).

Due to industrialization and the rural exodus, disorderly population growth in the cities was accentuated, converting the old cities into the large urban centers that are identified today, and this growth caused environmental and social impacts. According to Paulo (2012), the lack of

city planning and the high population growth cause environmental degradation and contribute to the marginalization of the population. It also brought other negative consequences, such as increased pollution, changes in the microclimate, increased flooding, lack of open public spaces and vegetation.

## **2.2 Climatology in the urban setting**

According to Mendonça and Oliveira (2007), the study of climatology emerged to research the spatialization of atmospheric elements and phenomena and their evolution, in addition to analyzing nature as part of society and its interactions, integrating the field of human sciences. The concern with the decline in the environmental quality of large Brazilian cities, a fact that became more evident from the 1960s on, was the main factor driving the emergence of studies related to urban climate in Brazil. However, it was from the 1970s that research in urban climatology registered the first case studies (MONTEIRO; MENDONÇA, 2003).

Thus, irregularities in social and natural actions usually cause urban climate phenomena, resulting in changes in the water and energy balance. In different situations, environmental changes in the urban context intensify the risks of disasters, such as the release of pollution into the atmosphere, thermal increase and soil waterproofing, which modifies the natural flow of surface runoff (PASCOALINO; JÚNIOR, 2021). These environmental changes generate immeasurable negative consequences for the planet and for living beings.

## **2.3 The importance of green areas and public open spaces**

Green areas in urban spaces play an important role in maintaining and guaranteeing environmental quality, especially in cities that have developed without proper planning, as a result of which these cities exhibit aspects of environmental degradation (BARGOS; MATIAS, 2011). In agreement with Henke-Oliveira (1996), it is understood that the concept of green areas needs to characterize the vegetation, but especially highlight the aesthetic, ecological, social and economic relevance. According to Henke-Oliveira (1996, p. 17), green areas can be defined as:

Permeable areas (synonymous with free areas), whether public or not, with predominantly arboreal or shrubby vegetation cover (excluding trees in the beds of public roads) that present potential functions capable of providing a distinct microclimate in the urban environment in relation to luminosity, temperature and other parameters associated with human well-being (leisure functions); with ecological significance in terms of geomorphological stability and mitigation of pollution and that supports an urban fauna, mainly birds, insects and soil fauna (ecological functions); also representing aesthetically striking elements in the landscape (aesthetic function), regardless of accessibility to human groups or the existence of cultural structures such as buildings, trails, electric lighting, streets or similar equipment; ecological, social and aesthetic functions may result in each other or in financial benefits (economic functions). (HENKE-OLIVEIRA, 1996, p.17).

According to Ferreira, Monteiro and Paula (2019), it is important to plan urban areas favoring the existence of open spaces, but even more essential is the use of green areas, as they can provide healthier and more pleasant environments for the population. “Because the green

area as a category of free space develops important functions in the urban space, such as the ecological function, in addition to the functions also present in the other categories of free spaces, such as social and leisure, for example” (FERREIRA; MONTEIRO; PAULA, 2019, p. 226).

## 2.4 Urban comfort

Humanity, when creating cities and urban agglomerations, changes the balance between the surface and the atmosphere, becoming an active actor in the process of changing the local climate, also interfering with the health and comfort of human beings in these spaces (Gobo, 2018).

According to Lin (2009), the implantation of numerous trees creates a kind of shelter, which can block a significant amount of direct flow of short-wave radiation, reducing the surface temperature. Usually individuals prefer, during warm seasons, cold temperatures and soft sunlight, in search of a behavioral adjustment, to seek shelter under trees. Thus, when designing public squares in hot environments and humid regions, shaded areas should be implemented.

Due to the specificities of each season of the year, furniture for resting should be arranged in different spots, since in hot temperatures human beings look for places with shade, while on cold days they prefer the sun. Even when people choose not to use these facilities to relax, the existence of these areas increases the tolerance of a thermal environment and consequently increases comfort (LIN, 2009).

## 3. METHODOLOGY

This study had as its main methodology the literature review, and it provides, according to Gil (2017), an analysis and investigation of a series of broader phenomena, becoming more productive than specific research.

The article is classified as a literature review, as it was developed from the selection of already published materials, observing what has already been researched on the subject. This research genre is understood in materials such as books, magazines, newspapers, theses, dissertations, scientific publications and materials available on digital platforms (GIL, 2017), used to reinforce the necessary argumentation and allowing to deepen the content. Thus, through this methodological basis, the bibliographic research analyzed the process of urbanization of cities and how the lack of urban planning directly reflects on environmental comfort. In addition, to collect information on the subject, the investigation of the contributions of green areas in this context was debated.

The research was carried out on scientific platforms: *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES)*, Google Scholar and through Research Gate. The keywords used were: “public green spaces”, “environmental comfort”, “urban climate” and “urban planning”.

Through the research carried out, after reading the titles and, later, the abstracts, 5 articles, 2 theses, 1 dissertation and 9 books were selected, which fit the parameters and objectives of the study. Thus, the objective was to answer the question that guides the research: do green areas belonging to public open spaces influence the environmental and climatological quality of Brazilian cities, favoring the urban microclimate and social well-being?

## 4. RESULTS

The selected articles were published in the following scientific journals: *Revista da Sociedade Brasileira de Arborização Urbana*, *Caderno de Geografia (PUC)*, Building and environment, *ModaPalavra e-journal* (Special Edition IDEMi - IV International Conference on Design, Engineering and Management for Innovation ), *Revista Brasileira de Geografia Física*. The research took place in some regions of the country (Juiz de Fora/MG, Santa Maria/RS and São Carlos/SP), 2 of which were international. The first thesis analyzed was taken from the repository of *Universidade de São Paulo (USP)*, through the Doctorate in Physical Geography, the second from the Doctorate in Production Engineering at *Universidade Federal de Santa Catarina (UFSC)* and the master's dissertation in Geography through *Universidade Federal de São Carlos (UFSCar)*. The books were chosen from the theme proposed in the article, related to physical geography, involving climatology, as well as architecture and urban planning, including public spaces and green areas and the concept of biophilia aligning with well-being. Table 1 below presents the authors, year of publication, title and objectives of the studies used in the article.

**Table 1- Identification of authors, year of publication, titles and general objective**

Authors	Year of publication	Title	Research objective
KELLERT, S.R; WILSON, E.O.	1993	The Biophilia Hypothesis	It examined how the tendency to focus on life and life-like processes may be a biologically based need, integral to our development as individuals and as a species.
HENKE – OLIVEIRA, C.	1996	Planejamento ambiental na cidade de São Carlos (SP) com ênfase nas áreas públicas e áreas verdes: diagnósticos e propostas	The general objective established in this study was to contribute to the environmental planning of São Carlos through concepts and socio-environmental indicators and geoprocessing.
AYOADE; J.O.	1996	Introdução à Climatologia para os Tópicos	Analyze aspects of climatology in tropical regions, pointing out how important the influence exerted on the climatology of temperate zones is.
MONTEIRO, C. A. D. F; MENDONÇA, Francisco.	2003	Clima Urbano	Evaluate Brazilian theory and methodology, which takes into account aspects of the country to rethink the problems that affect residents of large cities.
PILLOTO, Jane.	2003	Rede verde urbana: um instrumento de gestão ecológica	Discuss the application of ecological landscaping in the development of the Urban Green Network (RVU).
MENDONÇA, Francisco; OLIVEIRA, I. M. D.	2007	Climatologia: noções básicas e climas do Brasil	Identify the climate panorama and didactically define the differences between climatology and meteorology.
LEFEBVRE, Henri.	2008	O direito à cidade	The objective is to make thoughts and activities related to urbanism pass through political programs, in addition to proposing that these issues enter our conscience.
LIN, T. P.	2009	Thermal perception, adaptation and attendance in a public square in hot and humid regions	To examine user thermal comfort in a public square in Taiwan.

BARGOS, Danúbia; MATIAS, Lindon.	2011	Áreas verdes urbanas: um estudo de revisão e proposta conceitual	Pointing to vegetation as an important indicator of environmental quality due to ecological, aesthetic and leisure functions.
KOKOLA, Carolee.	2013	Urbanismo Sustentável: desenho urbano com a natureza	It shows how to configure the built environment for the benefit of humans and nature, prioritizing pedestrians and cyclists.
GEHL, Jan.	2015	Cidades Para Pessoas	It addresses issues that are fundamental to the quality of life in the city and that are reflected in the scale of spaces, in mobility solutions, in the dynamics that favor the vitality, sustainability and security of urban areas, and in the enhancement of public spaces.
LYNCH, Kevin.	2015	A boa forma da cidade	Study and understand the origin of the city and its function.
MIRA, Fabrício J. A.; FREIRE, Rafael C. R.; NAKATA, Milton K.	2015	Contribuições do design para o uso de realidade virtual no tratamento da síndrome do pânico	To analyze patients with episodes of panic and agoraphobia when using the subway and who are undergoing treatment using virtual reality.
GOBO, João Paulo.	2018	Bioclimatologia subtropical e modelização do conforto humano: da escala local a regional	Evaluate and propose human comfort indicators through environmental, subjective and individual variables, on a local and regional climate scale.
PAULO, Rodolfo Fares.	2018	Crescimento urbano desordenado: o papel do estado e da sociedade diante dos impactos socioambientais	Analyze the process of urbanization of Brazilian urban centers, taking into account the way it happened, as well as the consequences generated.
FERREIRA, Cássia; MONTEIRO, Ana; PAULA, Isabela.	2019	Áreas verdes e desigualdades sociais em um município de médio porte no Brasil	The objective is to calculate and spatialize the Public Green Areas Index (IAPV) to the city of Juiz de Fora – MG. The data show the need for a public policy that seeks the creation of green areas, especially to serve the peripheral regions of the city, where there is a higher population concentration, lower per capita income and lower IAV.
PASCOALINO, Aline; JÚNIOR, Eduardo. M. A.	2021	Vulnerabilidade na Cidade e as Escalas do Clima Urbano: o potencial das unidades climáticas para o planejamento	Observing the phenomena of the urban climate system through a lens of analysis – according to the geographic scales of the climate, the structure and form of the city.

Source: Table prepared by the authors (2022)

The use of some of the literature, reviewed studies in various areas of knowledge, expanding the possibilities of analysis, such as, for example, Ayoade (1996), Gehl (2015), GOBO (2018), Henke – Oliveira (1996), Kellert; Wilson (1993), Kokola (2013), Lin (2009), Lefebvre (2008), Lynch (2015), Mendonça; Oliveira (2007), Mira; Freire; Nakata (2015), Monteiro; Mendonça (2003), Paulo (2018), addressing mainly with regard to urban climatology, thermal comfort, the process of urbanization of cities and biophilia.

In accordance with the literature directly related to the theme, for Bargas and Matias (2011), green areas need to perform ecological functions, such as increasing thermal comfort, controlling air and acoustic pollution, intercepting rainwater and sheltering fauna. In addition to

aesthetic functions and visual enhancement, leisure and recreation. According to Pascoalino and Júnior (2021), finding climatic units is a process based on intra-urban forms and dynamics on the city's climate. With this, the discussions and conclusions of Pilloto (2003), are necessary for the expansion and development of urban centers to present parks and green areas, creating and recovering the balance of the ecosystem, in addition to being essential in the quality of life of the population.

Analyzing one of the regions presented in the studies, according to the conclusions of Ferreira, Monteiro, Paula (2019), with specific research in the municipality of Juiz de Fora, it was detected the need for a better distribution of public green areas in the city, offering citizens the right to experience better urban environments and health promotion.

Coming from urbanization and consequently the disconnection of people with nature, the authors discussed above carried out research that proves the benefits of human interaction in green areas, due to climatic comfort and well-being, as presented and discussed throughout the article.

## **5. CONCLUSION**

The implementation of green areas in public open spaces, with due compliance with the laws in force in each location, contributes to microclimate comfort and, consequently, greater use of these spaces by people. In this way, the maintenance of existing green areas in the municipalities also becomes extremely necessary. It appears, then, that adequate urban planning with the implementation of green areas and open public spaces are necessary to enable human beings to live in public spaces, improving the comfort and health of those who use them. In addition to promoting sociability, leisure and physical exercise areas.

The research presented also exposes the importance of public green spaces for the population as a tool for environmental responsibility, as vegetation in its various forms interferes with the control of environmental quality, thermal, acoustic or luminous comfort. Thus, aiming to protect these spaces, the effects of the research results can help and be disseminated to the responsible offices for urban planning, as a contribution to the preservation and quality of life of these places population.



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