



Conservation Challenges of Modern World Heritage in the Case of Brasília: The Misalignment of Modernist Planning with Contemporary Urban Realities

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Abstract

This research article critically examines Brasília, one of the most comprehensive examples of modern urban planning, within the context of modernism's theoretical foundations, the city's historical development process, and its UNESCO World Heritage status. The city, designed in line with modernism's principles of rationality, functionality, and progress, is now showing incompatibilities with social transformation, transportation dynamics, public space usage, and sustainability requirements. The study evaluates modern planning literature, archival and planning documents related to the founding of Brasília, and UNESCO monitoring and evaluation reports using qualitative content analysis methods. The findings reveal problem areas such as loss of functionality in symbolic areas such as the Monumental Axis, weakening of pedestrian-oriented design in the Superquadra settlement model, failure of public spaces to respond to social needs, and inadequacy of current planning approaches that take ecological sensitivity into account. The study demonstrates that maintaining only formal integrity is insufficient for preserving Brasília's modern heritage; a holistic conservation approach that incorporates user needs, accessibility criteria, and sustainability principles is essential. In this context, realigning modern planning principles with contemporary urban living practices is critical for both the continuity of Brasília's heritage value and the future transformation of modern cities.

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1. Introduction

Modernism is accepted as a comprehensive cultural paradigm that emerged in Europe in the late 19th century and led to fundamental transformations in architecture, art, urban planning, systems of thought, and social life. As Frampton (2020) states, modernism represented a break from historical aesthetic and traditional architectural understandings; it created a new spatial and intellectual framework centered on rationality, functionality, technology, and the ideal of progress. Modernity, on the other hand, is understood as the reflection of this intellectual transformation on social structures, economic relations, and life practices; it is shaped by industrialization, mass production, urbanization, and scientific developments (Giddens, 1990). In this context, the impact of modernism on the disciplines of architecture and urban planning led to radical spatial transformations throughout the 20th century.

The modern approach in architecture and urban planning is defined by functional zoning, simple geometric forms, spatial arrangements based on social reform ideas, opposition to ornamentation, and rational planning principles. According to Curtis (1996), modern architecture is not merely an effort to produce formal innovation but also carries the claim of representing social progress spatially. Principles urban planning approach advocated the reorganization of urban life according to more orderly, healthy, efficient, and "rational" principles; in this context, principles such as wide boulevards, open green space systems, functional zoning decisions, and mass housing production have been decisive in many modern urban plans.

The strengthening of the view that modern architectural products have cultural heritage value since the second half of the 20th century has brought about important debates in conservation theory. Choay (2001) emphasizes that modern heritage cannot be evaluated using traditional conservation principles and that concepts such as authenticity, integrity, material continuity, and ideological representation need to be redefined in different ways in the context of modern architecture. Modern architectural heritage has become a multidimensional type of heritage not only because of its physical characteristics but also because of its layers such as modern state ideology, claims of social reform, construction of national identity, and representational power (ICOMOS, 2013). With UNESCO WHC (World Heritage Centre) beginning to include modern heritage sites on the World Heritage List, the preservation of modern cities, continuity of use, sustainability, and accessibility have become one of the priority areas of discussion in international conservation literature.

Brasília considered one of the most comprehensive applications of modernism in the world. The city was founded in 1960 as Brazil's new capital; with Lúcio Costa's Pilot Plan and Oscar Niemeyer's monumental buildings, it became a comprehensive spatial manifesto of modern design (Holston, 1989). The city plan, which resembles an airplane from a bird's eye view, presents a symbolic design approach that encompasses the construction of national identity, the ideal of modernization, and the spatial representation of central administrative power. Brasília was included in the UNESCO World Heritage List in 1987 as one of the most consistent and complete applications of modern principles at the city scale; in this respect, it is recognized as having outstanding universal value as "the first fully realized example of a modern capital city"

However, significant tensions have emerged in the alignment of modern planning approaches with the social, spatial, and environmental requirements of the 21st century. The literature indicates that the primary problems facing modern cities today include social fragmentation caused by functional segregation, vehicle-oriented transportation systems limiting pedestrian mobility, the weakening of effective use of public spaces, incompatibility with sustainability principles, and the inadequacy of heritage protection legislation in practice

(Scifoni, 2015). In the specific case of Brasília, these problems manifest themselves in the loss of functional diversity of the Monumental Axis, the inability of the Superquadra model to adapt to current user needs, the threat to the integrity of the heritage area posed by urbanization pressures, and the weakness of planning decisions requiring ecological sensitivity.

This study aims to critically examine Brasília, which falls under the category of modern architectural heritage, within the context of the theoretical foundations of modernism, urban planning principles, and UNESCO World Heritage status. The main objective of the research is to reveal the points of incompatibility between modern ideals and contemporary urban living practices and to determine the components of a holistic approach necessary for the preservation of modern heritage. In this context, the main question of the research is formulated as follows: How can a holistic conservation approach be developed that brings together user needs, accessibility criteria, and sustainability principles for the preservation of Brasília's modern heritage value? In addition to this fundamental question, the extent to which modern planning aligns with contemporary urbanization dynamics, how the issues highlighted in UNESCO conservation reports can be managed, and how modern heritage can be made sustainable not only formally but also functionally and socially will be discussed. Thus, the study aims to contribute to the reassessment of modern cities within the current balance of conservation and use.

2. Material and Methods

This study is designed as a research project examining Brasília's modern urban planning approach and the current spatial, social, and environmental issues arising in the context of its UNESCO World Heritage status. The research is a single-case study; it takes Brasília as an exemplary "planned capital" where modern ideals are embodied and aims to analyze the tensions between these ideals and current usage practices. Within this framework, the methodology consists of literature review, document and report analysis, and descriptive and interpretive thematic analysis of these data.

The first stage involved a comprehensive literature review on modernism, modernity, modern urban planning, planned capitals, heritage conservation, and sustainable planning approaches. In this context, fundamental sources on architecture and urban planning theory, theoretical texts addressing the historical background of modernism and its relationship with urbanization processes, and current academic studies analyzing examples of modern cities were evaluated. Publications discussing the effects of modern planning principles on public space, transportation design, functional zoning, and social life formed the backbone of the theoretical framework for the analysis of Brasília. In this process, studies that were not directly related to the subject or that offered a limited context were excluded; high-quality studies that addressed the spatial design of modern cities and heritage conservation debates together were preferred.

In the second stage, official documents, planning decisions, and international reports related to Brasília were systematically examined. UNESCO's monitoring and conservation reports evaluating Brasília as a World Heritage site were used as fundamental reference sources to reveal the points of incompatibility between the goal of preserving the city's modern integrity and user needs, social change, and sustainability demands. In addition, local-scale planning documents related to the city's urban development, plan revisions, transportation, and open space arrangements were evaluated as secondary data in the analyses. Components such as the Monumental Axis, Superquadra settlement model, open and green space system, and pedestrian and vehicle transportation design were examined through both plan notes and critical academic studies related to these documents. At this stage, data produced by different institutions were considered comparatively, considering the principles of data diversity, consistency, and comparability.

In the third stage, qualitative content analysis and thematic analysis were applied to the data obtained from the literature and document review. First, an evaluation framework was established based on modern planning principles, heritage conservation approaches, and sustainability criteria. Within this framework, the urban space was conceptually structured under the following headings: (i) morphological integrity and symbolic structure, (ii) public space use and social interaction, (iii) transportation and accessibility, (iv) ecological sensitivity and open/green space system, and (v) heritage management and continuity. Subsequently, the problem areas identified specifically in Brasília were placed within this thematic framework and interpreted. Thus, the points of harmony and disharmony between modern ideals and current spatial practices were evaluated not only formally but also in terms of their social and functional dimensions.

Thanks to this methodological approach, Brasília's modern heritage quality is addressed not only as a registered "object" but also as a living urban environment and the spatial stage of constantly changing social practices. The extent to which modern design overlaps with today's discussions on sustainability, accessibility, and publicity is questioned, forming the theoretical basis for the assessments presented in the following sections.

3. Results and Discussion

3.1. Brazil's historical background

Brazil's historical development has a multi-layered structure, beginning with indigenous cultures dating back thousands of years, followed by European colonization, the imperial period, the founding of the republic, and modernization processes. Archaeological evidence shows that human settlements existed in Brazil at least 11,000 years ago. The "Luzia Woman" discovered in the Minas Gerais region is considered one of the oldest humans remains in South America and proves that the region has been inhabited since the Paleolithic period (Neves & Hubbe, 2005). Pottery found in the Amazon basin reveals that communities in the region had a developed production culture 8,000 years ago (Roosevelt, 1999). Contact with Europe began in 1500 with the arrival of Portuguese navigator Pedro Álvares Cabral on the continent, marking the beginning of Brazil's approximately three-century-long period of Portuguese colonization (Schwartz, 1985). The first colonial activities were based on the trade of pau-brasil (Brazil wood), which also gave the region its name. This tree species, which was in high demand in Europe for obtaining red dye, was intensively exploited in the 16th and 17th centuries, and smuggling and pirate attacks significantly affected the region's economic and political structure (Dean, 1995). In the 17th and 18th centuries, Brazil became a stage for colonial rivalry; in particular, the Dutch occupation of the Pernambuco region and the conflicts between 1648 and 1654 were critical processes that determined the political control of the region. The 1750 Treaty of Madrid redrew the borders between Portugal and Spain, leaving most of the colonial territories in South America to Portugal (Prado, 2014). The 18th century was a turning point in Brazilian history. In 1807, the Portuguese royal family moved to Rio de Janeiro due to Napoleon's invasion, making the city the capital of the Portuguese Empire for 13 years. During this period, Brazil gained significant momentum in terms of economic and cultural development (Maxwell, 2003). Independence was declared in 1822 and, after two years of conflict, was recognized by Portugal in 1825, marking the beginning of the Brazilian Empire.

The late 19th century saw critical social reforms in terms of the country's social and political transformation. The abolition of slavery in 1888 made Brazil the last country in the Americas to abolish slavery. The following year, in 1889, the Brazilian Republic was proclaimed when Marshal Deodoro da Fonseca seized power. Throughout the 20th century, the country exhibited a governance structure that oscillated between military coups, political instability, and development programs. The Getúlio Vargas era, particularly between 1930 and

1945, stands out for its industrialization-based economic model and authoritarian governance (Skidmore, 1999). Between 1964 and 1985, the country was ruled under a military dictatorship, and the transition to democratic rule began in 1985 with the election of Tancredo Neves. The 1988 Constitution laid the foundation for Brazil's contemporary democratic structure. In the 21st century, Luiz Inácio Lula da Silva's presidency (2003–2010) drew attention with its social policies and economic growth; Brazil positioned itself as a rising economic actor on the global stage (Hunter and Power, 2007). This broad historical process formed the basis of modern Brazil's cultural and spatial structure; in particular, the establishment of the new capital Brasília in the mid-20th century has earned a special place in the country's history as a spatial expression of national identity, the ideal of modernization, and regional development goals.

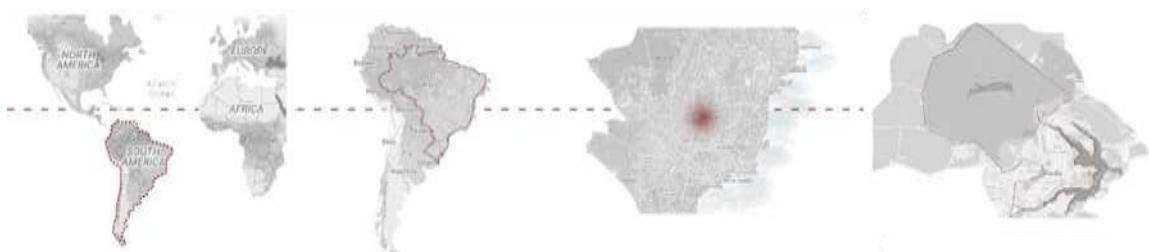


Figure1. The location of Brasília

Brasília is a modern capital city located within the boundaries of the Federal District (Distrito Federal), the center of the Federative Republic of Brazil. Geographically, it is built on the Brasília Plateau, located in the interior of the country at an altitude of approximately 1,100 meters. The city is a strategic settlement designed to boost development in the interior regions and strengthen national integration, located far from the country's coastline (Holston, 1989). Brasília's construction was completed in just 41 months, between 1956 and 1960. The city was officially declared Brazil's new capital on April 21, 1960, replacing Rio de Janeiro. As of 2021, the population living within the Federal District borders is 3,094,325, and the city is currently the country's administrative and symbolic center (Instituto Brasileiro de Geografia e Estatística-IBGE, 2021). The modern city of Brasília has a unique planning concept designed by urban planner Lúcio Costa and chief architect Oscar Niemeyer. The city plan developed by Costa is based on two main axes, evoking the shape of an airplane or a cross when viewed from above (Nobre, 2017).

- The east–west axis (Monumental Axis): brings together federal government buildings such as the Alvorada Palace (Presidential Residence), the Supreme Court (Supremo Tribunal Federal), the Chamber of Deputies (Câmara dos Deputados), and the Senate (Senado Federal). This axis has a monumental public space layout that spatially represents state power.

- North–south axis (Residential Axis): It contains the functional fabric that constitutes the city's daily life, with residential superblocks, commercial areas, service areas, and collective living units. Costa's "superquadra" concept stands out as the fundamental design component of planned and standardized residential units that organize modern urban life horizontally (Ferreira, 2005).

This planned and symbolic structure of the city offers a comprehensive interpretation of modern architecture and modern urban design principles. Brasília's location, as shown in Figure 1 and urban planning serve as an important example in international literature as a concrete spatial expression of Brazil's 20th-century modernization ideals (UNESCO, 1987).

3.2. Founding figures of the modern capital brasília

Lúcio Marçal, Ferreira Ribeiro, Lima Costa (1902–1998) is considered one of the most influential figures in modern Brazilian architecture and urban planning as we can see them in Figure 2. Born in Toulon to a Brazilian family, Costa continued his education in England and Switzerland, graduating from the Escola Nacional de Belas Artes in Rio de Janeiro in 1924 (Kessel, 2010). Although he produced works in an eclectic style in the early stages of his career, he became one of the pioneers of the modern architecture movement in Brazil after 1929, when he embraced modernism.

His collaboration with Gregori Warchavchik in the 1930s was a critical turning point in the institutionalization of modern architecture in Brazil. Costa took over as director of the National School of Fine Arts (ENBA) during the same period but was removed from office due to his reformist views (Mindlin, 1999). Costa joined the newly established National Historical and Artistic Heritage Service (SPHAN) in 1937 and played a decisive role in shaping the institution's architectural heritage policies for many years.

Lúcio Costa's architectural approach was characterized by a synthesis that reconciled traditional Brazilian building techniques with modern principles. The 1939 New York World's Fair Brazil Pavilion, designed in collaboration with Oscar Niemeyer, was one of the important projects that increased the international visibility of Brazilian modernism (Goodwin, 1943). In addition, structures such as the Parque Guinle residential complex, the Hotel São Clemente in Nova Friburgo, and the Ministry of Education and Health (MEC) building are major works that reflect his understanding of modern architecture.

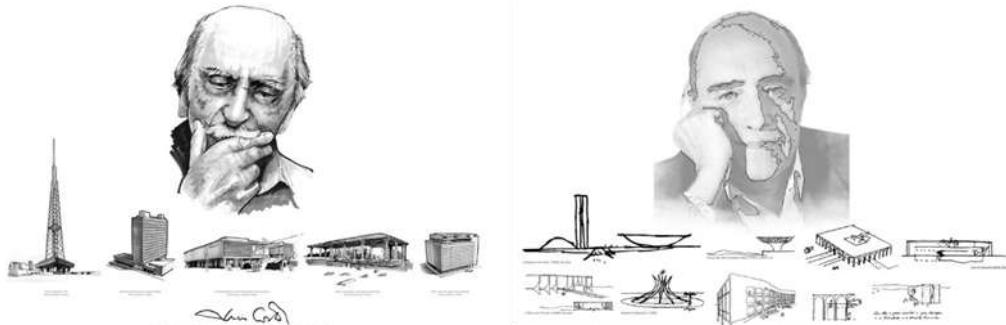


Figure2. Founding Figures of the Modern Capital Brasília

Costa's most important contribution is undoubtedly the Pilot Plan for Brasília. Having won the international competition launched in 1957 to design the new capital, Costa conceived the city around two main axes, evoking the shape of an "airplane" or a "dragonfly." Integrating the Monumental Axis and the Settlement Axis, this plan brings together the social, aesthetic, and functional principles of modern urban design in a holistic approach (Holston, 1989). Costa has earned a unique place in the history of modern urban planning with Brasília. Oscar Ribeiro de Almeida Niemeyer Soares Filho (1907–2012) is considered one of the most original and influential representatives of 20th-century modern architecture. Born in Rio de Janeiro, Niemeyer completed his architectural education at the Escola Nacional de Belas Artes and began his career in the studio of Lúcio Costa and Carlos Leão (Bruand, 2001).

Niemeyer's contribution to modern architecture, with its curved forms, fluid geometries, and sculptural approach to building, made a huge impact internationally. His participation in the 1936 project for the Ministry of Education and Public Health (MEC) building, under the direction of Lucio Costa, ensured his powerful entry onto the modern architecture scene. The

sections designed by Niemeyer were one of the important steps representing Brazilian modernism on the international stage.

The design of the Brazilian pavilion at the 1939 New York World's Fair increased his international recognition. His selection for the design team of the United Nations Headquarters in 1947 made Niemeyer one of the most important actors in global modern architecture. However, his leftist views and membership in the Brazilian Communist Party led to political pressure, particularly during the 1964 military dictatorship; due to these conditions, he moved to Paris in 1965 and continued his work in Europe and North Africa (Frampton, 2020).

Throughout his career, Niemeyer developed not only architectural structures but also furniture designs and spatial arrangements on an urban scale. The University of Algiers, the Mondadori Headquarters (Italy), and the French Communist Party Headquarters are some of his international works. However, his most iconic work is undoubtedly the public buildings of Brasília. Buildings such as the Planalto Palace, the National Congress Building, the Itamaraty Palace, and the Brasília Cathedral are considered masterpieces representing the sculptural and symbolic power of modern architecture (UNESCO, 1987).

Niemeyer's famous approach that "architecture is invention" clearly reveals the central role of creativity, social responsibility, and aesthetic sensitivity in his design philosophy. Niemeyer, who continued to produce until his death in 2012 at the age of 104, was a decisive figure in Brasília becoming the only modern capital city to be included on the UNESCO World Heritage List.

The founding process of Brasília is considered one of the most radical and comprehensive applications of 20th-century modern urban planning. The city was built between 1956 and 1960 under the framework of then-President Juscelino Kubitschek's "5 years of development in 50 years" policy, with the aim of developing the country's central regions and achieving national integration (Holston, 1989). Lucio Costa's urban design, called Plano Piloto, and Oscar Niemeyer's modern architectural approach made Brasília not only a new capital but also a spatial representation of the modern nation-state ideology.

Costa's city plan, when viewed from above, evokes a slightly curved cross shape, or, according to a more widely accepted interpretation, the figure of an airplane or a dragonfly. This form aimed to give the city a functional hierarchy; the Monumental Axis, running along the long East-West direction, contained the state center, including the executive, legislative, and judicial buildings; while the North-South settlement axis housed residential areas, social facilities, and daily life functions (Scott, 2013). The wide perspective on the Monumental Axis highlights large-scale architecture that emphasizes state power, while the settlement axis is planned on a more human scale.

In Costa's design, residential areas are organized in the form of "superblocks" (superquadras). Each "neighborhood unit" (unidade de vizinhança), consisting of four superblocks, was designed to meet the basic requirements of daily life, such as schools, places of worship, small commercial units, health centers, green spaces, and cultural venues (Mumford, 1961). This model embodied a modern social ideal that aimed to bring together different socio-economic classes to live in similar spaces. Indeed, it was often stated in the discourse of the time that having congressmen and their drivers living in the same superblock would be a "spatial symbol of a new and egalitarian society" (Holston, 1989).

The primary criticism of Brasília's spatial organization is the lack of pedestrian mobility created by modernism's rigid zoning principles. The city lacks a traditional street fabric; buildings are separated by wide roads and open spaces. As there are limited paths designated for pedestrians, a large part of daily life has become dependent on car use. This situation has

been criticized by theorists such as Jane Jacobs, who evaluate urban life through "interaction on the street," as a fundamental flaw in the modern urban planning approach (Jacobs, 1961).

In the planning process of Brasília, the bird's-eye perspective, that is, reading the city from above, played a central role. This approach, which occupies an important place in Le Corbusier's modern planning concept, emphasizes the geometric purity and symmetrical order of space (Le Corbusier, 1935). Lucio Costa also initially presented his design as a simple cross and later transformed this drawing into a curved form on the horizontal axis. Costa's approach made it possible to organize the city in line with modern ideals.

However, the city's experience at ground level was not found to be as powerful as its bird's eye view appeal. In 1974, Brazilian writer Clarice Lispector described Brasília as "a beauty that is coherent when viewed from above, but alienating when viewed from below," emphasizing that the city's unnatural structure reflected the tension between modern dreams and human experience. These criticisms reveal that Brasília's modern planning ideals represent both a success and a limitation.

Ultimately, the creation of Brasília is a unique experience where modern planning principles merged with a national project. Both its architectural integrity and urban design vision have made the city one of the most important examples in 20th-century planning history; because of these characteristics, it was included in the UNESCO World Heritage List in 1987.

3.3. Brasília on the world heritage list

Brasília's inclusion in the UNESCO World Heritage List in 1987 is a result of the international recognition of the city's multi-layered values, not only in terms of modern planning but also in its cultural, artistic, and natural context in Figure 3. As a completely planned and rapidly constructed capital city, Brasília is considered one of the most striking examples of 20th-century modernism embodied on an urban scale. This is directly related to the city's design by Lucio Costa and Oscar Niemeyer, who adapted Le Corbusier's principles of modern urbanism to the Brazilian context (Holston, 1989; UNESCO, 2024).

First and foremost, Brasília has been considered a turning point in the history of modern urbanism. The purpose of Brasília's founding was not to be part of an expanding metropolis or to reshape an existing urban structure; it was to create a new capital city on completely empty land, designed to rebuild the national identity. In this sense, although Brasília is compared to contemporary capitals such as Chandigarh in India, it is described as the pinnacle of modernism in terms of its scale, holistic planning approach, and symbolic nature (Pendlebury, 2013).

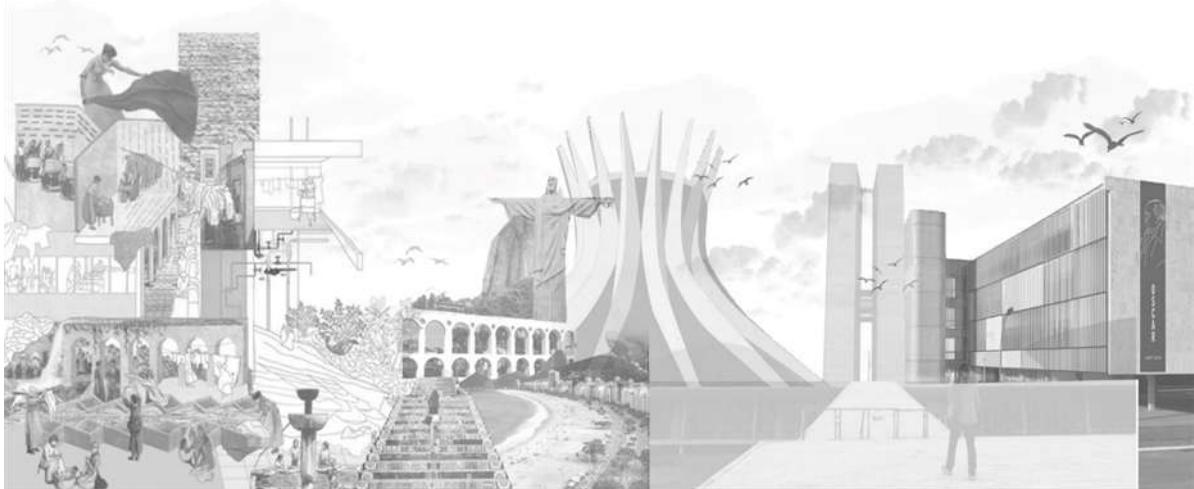


Figure3. Brasília on the World Heritage List

One of the most important factors contributing to the city's recognition by UNESCO is Brasília's highly integrated urban plan. Lucio Costa's Plano Piloto is based on two main axes in the shape of a cross and applies the fundamental principles of functionalist modernism—spatial hierarchy, separation of functions, reorganization of transportation, and large open spaces—on an urban scale. With these qualities, Brasília is one of the rare examples of modern urban planning theories put into practice (Scott, 2010).

Furthermore, the city possesses a superior architectural integrity thanks to Oscar Niemeyer's masterpieces. Monumental structures such as the National Congress, the Presidential Palace, the Supreme Court, and the cathedral represent the symbolic power of modern architecture and lend the city a universal aesthetic value. In this sense, Brasília's architecture is not only functional but also the product of an artistic vision (Frampton, 2020).

Another decisive factor in Brasília's protection by UNESCO is the city's cultural and artistic character. Sculptures, murals, and public art installations on a city scale reinforce the urban identity by supporting modern aesthetics. The city also serves as a socio-cultural laboratory, offering a spatial counterpart to new ways of life, collective use of space, and social modernization (Holston, 1989).

In terms of its natural context, Brasília is also ecologically important due to its location within the cerrado ecosystem. Rich in biodiversity, this region is in the transition zone between the Amazon, Prata, and São Francisco basins and plays a critical role in preserving the city's natural landscape (Silva and Bates, 2002). UNESCO also considers the harmonious coexistence of cultural heritage and the natural environment as part of its outstanding universal value.

In conclusion, the reasons for Brasília's inclusion in the World Heritage List are not limited to aesthetic and architectural achievements; the city is also internationally recognized as a multidimensional heritage site due to its innovative urban planning approach, ideals of social modernization, strong symbolic values, and rich natural environment.

3.4. Brasília's outstanding universal value, authenticity and integrity

Brasília is a city that comprehensively embodies the modern urban planning ideals of the 20th century and, in this respect, occupies an exceptional position among world heritage sites. Designed by Lucio Costa and Oscar Niemeyer, this modern capital is regarded not only as an administrative center but also as a spatial manifesto of modernization. Completed at an extraordinary pace between 1956 and 1960, Brasília is the most powerful symbol of President Juscelino Kubitschek's development program, known as the "plano de metas." The city offers both an ideological and spatial expression of the application of modern principles in a tropical geography (Holston, 1989).

Lucio Costa's Plano Piloto is a unique interpretation of modern urban planning, organizing the city around two main axes and creating a holistic spatial composition. The Monumental Axis forms a symbolic line where state institutions are located, while the residential axis includes quiet, landscape-integrated residential areas where modern life is organized through the superquadra form. Through these two axes, Costa aimed to achieve both the spatial representation of state authority and the construction of a modern order for individual daily life. The residential blocks rising above the pilotis reflect the fundamental principles of modern architecture, which lend lightness to the structure and open the ground floor to public use (Nobre, 2017).

Oscar Niemeyer's architectural work is one of the most powerful elements defining Brasília's modern identity. Niemeyer's use of concrete as a sculptural form language presents a unique aesthetic defined as a tropical interpretation of modern architecture. Buildings such as the National Congress, the Planalto Palace, the Supreme Court, and the Brasília Cathedral

occupy a privileged place in the history of modern architecture in terms of fluidity of form, geometric dynamism, and symbolic meaning production (Frampton, 2020). This architectural approach, combined with Costa's rational planning, makes Brasília one of the most comprehensive modern examples in world architectural history.

UNESCO's designation of Brasília as having outstanding universal value is based on two fundamental criteria. The first, criterion (i), emphasizes that the city is an exceptional expression of human creative genius. The design and construction process of Brasília is one of the rare examples of modern architecture and urban planning ideals being applied with the aim of building an entirely new national identity. The holistic composition created on both an urban and architectural scale presents modernism not only as an aesthetic choice but also as a political and cultural project (Goodwin, 1943).

Criterion (iv), the second criterion, demonstrates that Brasília is one of the most prominent and original examples of the application of the urban planning principles of the Modern Movement. The principles of the Athens Charter, such as functional separation, scale hierarchy, and transportation organization, have been consistently applied throughout the city. The Superquadra layout offers standardized spatial units for modern living, while the Monumental Axis creates a spatial representation of state power. Niemeyer's administrative and cultural buildings create a comprehensive system as the architectural counterparts of this modern urban fabric (UNESCO, 1987).

Brasília's uniqueness is notable for the fact that it has been largely preserved in both its urban plan and architectural fabric. The characteristic spatial components of the Plano Piloto—intersecting axes, functional sector layout, Superquadra residential buildings, extensive green spaces, and monumental administrative buildings—still make the ideals of the original design visible. The city's uniqueness criteria, as defined by UNESCO, are evaluated at monumental, residential, social, and pastoral scales, and this multi-layered approach forms the fundamental framework that guarantees the sustainability of Brasília's unique character (Nobre, 2017).

The integrity of the city is ensured by the preservation of both spatial and functional components. Legal protection provided by federal and local governments supports the scale integrity of the Plano Piloto. However, increasing population, housing demand, and urban pressures threaten the heritage area to a certain extent. Nevertheless, most interventions are developed in accordance with the principles of the modern plan; the green belt surrounding the city defines Brasília's spatial boundaries, protecting the modern design from external influences (Holston, 1989).

As a result, Brasília maintains its outstanding universal value as one of the most comprehensive, consistent, and holistically preserved modern capitals in the history of modern architecture and urbanism. The city is one of the rare examples where not only modern architecture but also modernization as a political ideal has been transformed into a spatial form. Therefore, the uniqueness and integrity of Brasília remain an important reference for modern architectural heritage conservation approaches today.

3.5. Brasília world heritage site map

Included in the UNESCO World Heritage List in 1987, Brasília holds a unique position internationally as a comprehensive example of modern urban design and 20th-century architecture. The conservation area defined within the city plan developed by Lucio Costa under the name Plano Piloto has a comprehensive cultural landscape quality, including monumental buildings, residential blocks, green spaces, public open spaces, and landscape arrangements (UNESCO, 2024). This asset map defines the areas where Brasília's modern principles are embodied with strong coherence at the spatial scale.

The Monumental Axis (Eixo Monumental), which forms the backbone of the city, is an urban axis where the main structures representing Brasília's administrative, political, and symbolic identity come together in a comprehensive order as we see in Figure 4. Designed by Oscar Niemeyer, the Planalto Palace (Palácio do Planalto) reflects the simple, fluid, and sculptural expressions of modern architecture as the center of executive power. One of the most important buildings located on this axis is the National Congress Building, which houses the Senate and the Chamber of Deputies. With its two characteristic domes and vertical towers, this structure has become a spatial symbol of modern aesthetics and national political representation (Frampton, 2020). The Palace of Justice (Supremo Tribunal Federal), with its curved columns and transparent facade, is one of the most prominent examples of Niemeyer's characteristic architectural language (Holston, 1989).

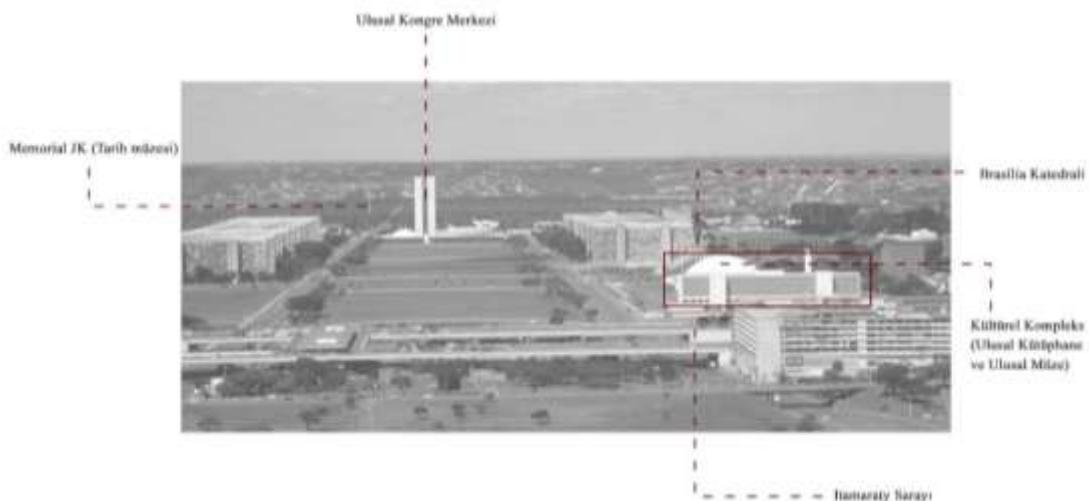


Figure4. The Monumental Axis (Eixo Monumental)

One of Brasília's most iconic structures, the National Cathedral (Catedral Metropolitana), with its concrete ribs in a hyperbolic paraboloid form, ranks among the pioneering examples of modern religious architecture. The JK Memorial, an important part of the city's political memory, offers a historical narrative as it is dedicated to Juscelino Kubitschek, who led the process of founding Brasília (Pendlebury, 2013).

The Superquadra housing units are also an important component of the UNESCO heritage site. Designed in line with Costa's understanding of the modern lifestyle model, these housing blocks, surrounded by wide green belts and housing schools, places of worship, small-scale commerce, and social service areas within the neighborhood unit, transform modern urbanization ideals into a holistic living environment (Scott, 2010). Superquadras are important not only for their architectural and textural characteristics but also for offering spatial counterparts to modern lifestyles.

The asset map covers not only the built environment but also Brasília's landscape elements and natural surroundings. The vegetation specific to the Cerrado ecosystem, water surfaces, recreational green areas, and protected natural areas within the city are considered integral parts of a holistic urban landscape within the framework of modern planning approaches. The preservation of the natural landscape is considered one of the fundamental elements of the site's outstanding universal value (Silva and Bates, 2002).

Around the Plano Piloto, which forms the modern core of Brasília, several rural and urban settlements dating from before the city's construction are also important components of the Federal District's cultural heritage. These areas include the Historic Center of Planaltina (1859),

the Historic Center of Brazlândia (1933), and old farms located in the Federal District (Sobradinho, Monjolo, Capão dos Porcos, Bela-Vista, Gama, Curralinho, Ponte Alta, etc.). Planaltina is the oldest urban center that existed before Brasília was built and, despite its current position as a satellite city, it has largely preserved the historical fabric of the region. The Federal District's natural heritage sites also occupy an important place on the asset map. Brasília National Park, Águas Emendadas Biological Reserve, IBGE Biological Reserve, Cabeça de Veado Biological Reserve (Botanical Garden), São Bartolomeu and Descoberto Environmental Protection Areas are included in this scope. These areas support an ecosystem-based conservation approach aimed at preserving the region's landscape diversity. In addition, the area surrounding Lake Paranoá, the Maranhão Basin, and other proposed reserve areas have been considered as additional conservation areas to strengthen the representativeness of the Cerrado biome. Some of the workers' camps built during the founding of Brasília have survived to the present day and are considered valuable early examples of modern architecture combined with wooden construction techniques. Vila Planalto, Vila Metropolitana, Candangolândia, and other worker settlements are living witnesses to both modern planning concepts and the social history of the city's construction process. Structures located in these areas, such as the Fátima Meryem Ana Church, the São José Operário Church, and the Julia Kubitschek School, are among the important early architectural examples from the founding period of Brasília.

In Figure 5 all these components demonstrate that the Brasília World Heritage Site Map represents not only modern planning but also the need to understand the region's historical settlements, natural landscape, social structure, and cultural diversity as a shared heritage. The joint assessment of the modern urban fabric with historical-rural settlements and the natural environment forms the basis of Brasília's multi-layered cultural landscape character. For this reason, Brasília has been recognized by UNESCO as one of the exemplary representatives of modern architecture, urban modernity, and cultural landscape integrity (UNESCO, 2024).

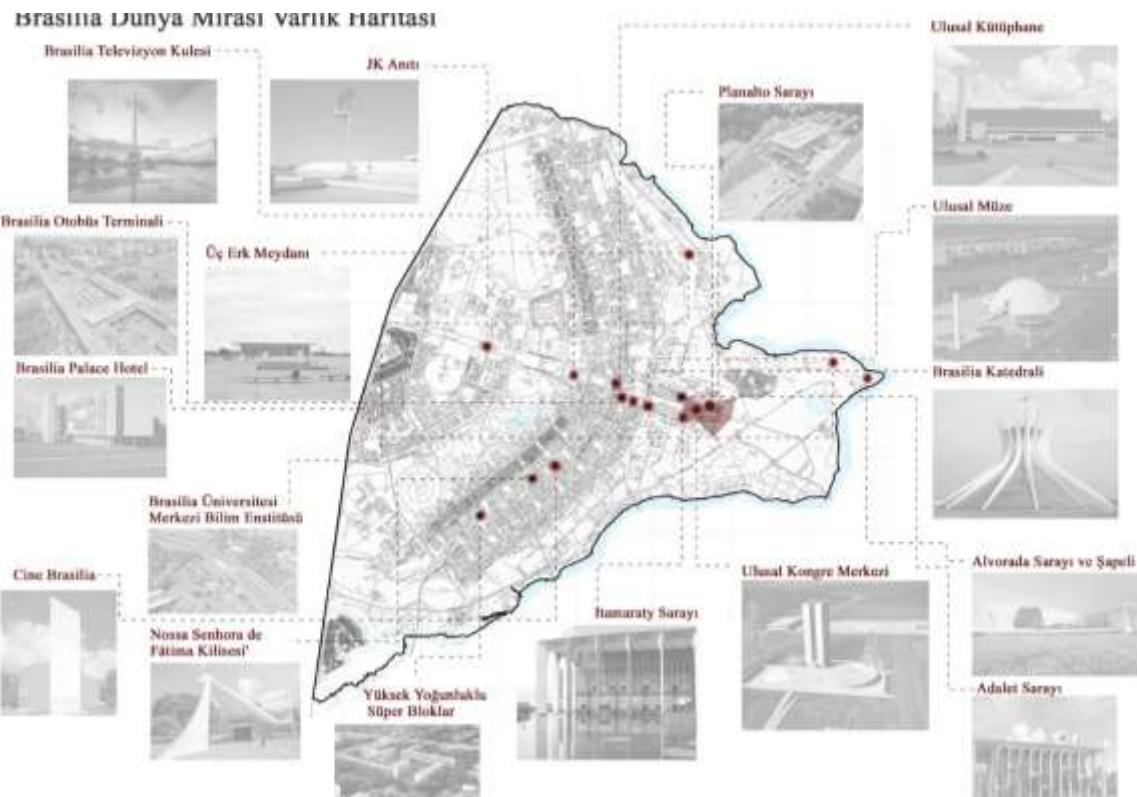


Figure5. Brasília World Heritage Site Map

3.6. Reading brasília UNESCO conservation status reports

It encompasses the area designed as Brazil's new capital and elements that bear witness to each stage of the Federal District's occupation process and the city's construction history. To ensure Brasília's legal protection, this area has been divided into three protection zones corresponding to different levels of control. These are mapped in Figure 6: 1. Special Protection Area (AIEsp) (Área de Interesse Especial de Preservação), 2. Buffer Zone (AAm) (Área de Amortecimento), 3. Protection Area (AIP) (Área de Interesse de Preservação). The special preservation area covers the monumental axis and the residential axis. This area is subject to strict regulations to ensure the integrity of Brasília. The buffer zone covers four areas adjacent to the monumental axis and the residential axis, providing a gradual transition to the special preservation area. The preservation area covers the entire pilot plan of Brasília, with emphasis on the preservation of iconic structures within the plan.

The monitoring of Brasilia under its UNESCO World Heritage status has been shaped by regular conservation status reports since the early 1990s. Initial assessments noted that the area known as El Polígono, which contains the city's core modern plan, had been preserved in its entirety despite rapidly increasing population pressure. UNESCO (1993) emphasized the need for the harmonious integration of urban development and heritage conservation objectives and welcomed Brazil's initiative to organize an international forum. The concept of "El Polígono" is used to describe the city's geometric layout and modern planning approach, symbolizing Brasília's departure from traditional urban models (Holston, 1989; UNESCO, 1993).



Figure6. Federal District's occupation process

By the early 2000s, UNESCO's assessments clearly revealed the new pressures facing the city. Brazilian representatives reported that strict regulations were being followed in all construction activities, but that the population had grown to several times the designed capacity, creating pressure, especially in the surrounding satellite cities. Despite this, UNESCO (2000) noted that the World Heritage value was being preserved in a holistic manner at the center.

Reports during this period also pointed out that the technical recommendations did not fully correspond to the situation on the ground.

The 2001 reports emphasized that the population of Plano Piloto remained stable, but rapid growth in the surrounding areas caused intense pressure on infrastructure and transportation (UNESCO, 2001). The lack of an effective public transportation system increased vehicle traffic within the protected area, posing a threat to spatial integrity. Therefore, the State Party proposed solutions such as awareness programs, an inventory of Plano Piloto, strengthening institutional capacity, developing conservation plans, and preparing a comprehensive Master Plan.

UNESCO noted that comprehensive technical studies were carried out during the 2003–2004 period, particularly regarding the protection of the natural environment, the regulation of the Paranoá Lake shoreline, and the preservation of the character of the Plano Piloto. The study "Coastal Characterization and Development Model" prepared for Lake Paranoá assessed the current threats to Costa's principles and provided guidelines that would form the basis for the Master Plan (UNESCO, 2004). During the same period, the study "Superquadra: Tempo e Espaço" detailed the conservation criteria for the use of residential blocks.

In the 2009 assessments, new urban development initiatives around Lake Paranoá, the lack of buffer zones, irregular changes in commercial areas, and the absence of a comprehensive Master Plan were identified as critical threats to heritage values (UNESCO, 2009). To address these issues, the Plano de Preservação do Plano Urbanístico de Brasília (PPCUB) was prepared, proposing new projects such as a tram line to solve transportation problems.

Reports from 2010 indicate that the Urban Complex Protection Plan was officially submitted and that the technical documentation for the W3 Boulevard and VLT line was sent to UNESCO. However, it was reported that the Orla Project on the Paranoá riverbank was restarted on a smaller scale, with the aim of restoring visual and physical integrity (UNESCO, 2010). Although new regulations were introduced for the South Trade Areas during this period, lack of oversight led to problems in implementation. In Vila Planalto, new planning initiatives were launched under the supervision of IPHAN to preserve the historical fabric.

The 2011 and 2012 reports stated that work on revitalizing W3 Boulevard had been halted, the VLT project had been suspended, and privatization pressures had increased along the shores of Lake Paranoá. These developments were found to be contrary to Costa's principle of public ownership of coastal use (UNESCO, 2011). It was also emphasized that the PPCUB had not been completed and that significant revisions were needed to the Land Management and Use Plans (UNESCO, 2012).

The 2019 reports stated that the misinterpretation of Brasília's four-scale structure (monumental, residential, social, pastoral) led to planning errors, particularly that the proposed increase in density in areas adjacent to the Monumental Axis threatened the heritage value (UNESCO, 2019). Therefore, the State Party was called upon to develop regular dialogue mechanisms with all relevant stakeholders.

The 2021 and 2023 evaluations reveal that the management preparation processes were disrupted due to COVID-19 and that the Management Plan has not yet been completed (UNESCO, 2021; UNESCO, 2023). In addition, the potential impacts on heritage values of proposals such as the redevelopment of the South Commercial Sector and the planning of a new neighborhood in the buffer zone were discussed. The 2023 report noted that some cultural artifacts were damaged during the political attacks on January 8, 2023, but that there was no structural damage to the buildings.

These processes demonstrate that the challenges faced in preserving Brasília as a modern world heritage site are not only related to physical deterioration but also to governance, planning, and social pressures. The general trend in UNESCO reports indicates that a comprehensive, participatory, and holistic approach to governance is essential for Brasília to sustain its values.

3.7. Brasília's problems

Despite being a comprehensive example of 20th-century modern urban design, Brasília, a modern capital city with UNESCO World Heritage status, currently faces various conservation issues at the spatial, administrative, social, and environmental levels. UNESCO's conservation status reports spanning 1993–2023 show that the city's problems are not limited to physical deterioration; they are fueled by multidimensional dynamics such as management processes, population pressure, dysfunctional modern spaces, and social transformation.

- The challenges facing Brasília can be discussed along four main axes:
- spatial functionality issues,
- socio-spatial inequality and excessive population pressure,
- environmental challenges and ecological threats,
- administrative and institutional inadequacies.

Although Brasília occupies a central position in 20th-century urban planning history as one of the most radical and comprehensive examples of modern urbanism principles, the incompatibility between the modern ideals that were implemented and current socio-spatial dynamics has led to the emergence of various structural problems over time. Lucio Costa's plan, based on a strict separation of functions, a car-centric transportation system that does not prioritize pedestrians, an idealized low-density spatial organization, and a relatively limited analysis of environmental conditions, has made fundamental problems such as transportation, accessibility, social inequality, ecological degradation, traffic congestion, and urban sprawl visible today (Epstein, 1973; Holston, 1989; UN-Habitat, 2019).

One of the most prominent problems in the city is the one-dimensional nature of its transportation infrastructure. Since the automobile was positioned as the primary means of transportation in Brasília's founding paradigm, pedestrian and bicycle transportation systems are secondary and, in most cases, neglected. Wide vehicle lanes, the disjointed location of functional areas, and the discontinuity of pedestrian paths significantly reduce accessibility in the city; for this reason, the city is often defined in the literature as a "car city" (Barbosa and Lima, 2017). Limited public transportation options and the system's lack of integration further reinforce dependence on private vehicles.

Functional segregation, one of the key components of Costa's modern plan, has created a rigid zoning structure in the city space; the physical separation of residential, administrative, commercial, and work areas has created the necessity for long-distance travel in daily life. This situation has limited social interaction areas, weakened public life, and caused spatial fragmentation (Scott, 1998). This model, with its sharp separation of functions, significantly conflicts with today's contemporary urban planning principles focused on mixed use.

Another major problem in the city is the socio-spatial inequality that has deepened over time. While the Plano Piloto, the core of Brasília, offers a modern lifestyle model designed for high- and middle-income groups, low-income groups have been directed to satellite settlements outside the city center with inadequate infrastructure and public services since the construction process (Holston, 2008). This situation has created a clear social divide in the city, making it difficult for spatial justice mechanisms to function.

Large-scale land interventions during the founding phase of Brasília led to the destruction of a significant portion of the Cerrado biome. The clearing of large areas for urban development resulted in the loss of vegetation cover and a decline in biological diversity in the region. The control of water flow through Lake Paranoá and various dam structures altered the natural hydrological cycle; the disruption of ecological corridors had negative effects on fauna. The increase in paved surfaces has also intensified the urban heat island effect (Ferreira and Silva, 2015).

Traffic and transportation systems have become an increasingly pressing issue in the city as population growth has far exceeded expectations. The transportation infrastructure, initially designed for 500,000 people, has become incompatible with rapid population growth; vehicle traffic has intensified, and urban mobility has become inefficient (UNESCO, State of Conservation Reports, 1993–2023). The limited availability of public transportation options has made private vehicle use a necessity, further exacerbating traffic problems.

Finally, Brasília's low-density structure and the rapid growth of new settlements far from the center have triggered uncontrolled urban sprawl. Sprawl has led to increased infrastructure costs, the formation of irregular settlements outside the planned core, and difficulties in the effective delivery of public services (Maricato, 2011).

All these problems are shown in Figure 7 demonstrate that Brasília's spatial design, idealized in modern planning, is not fully compatible with today's urbanization dynamics. There is a growing consensus that the city needs to be re-examined in line with the principles of sustainability, accessibility, and social inclusiveness.

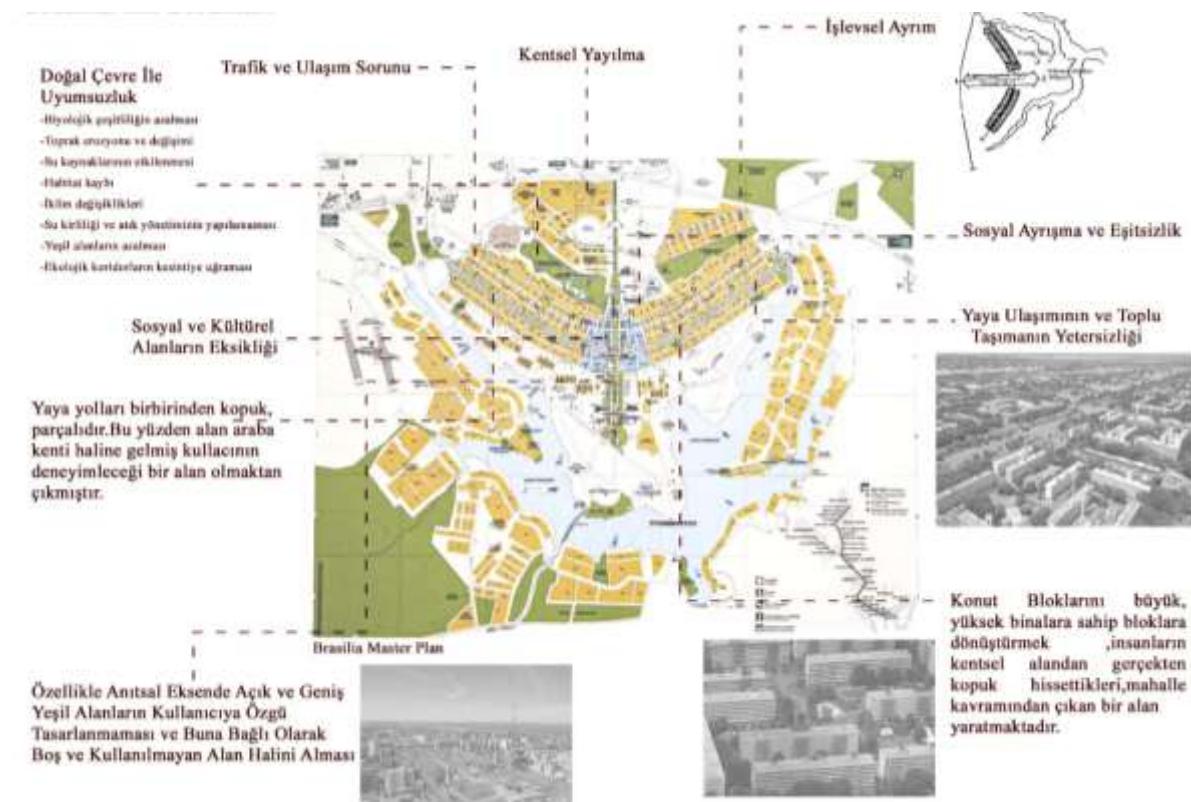


Figure 7. Brasília's Problems

4. Conclusion

Although the element of water in the spatial design of the Modern City of Brasília, particularly around Lake Paranoá, has historically been considered an important landscape component, the city's current usage practices show that this potential has not been sufficiently functionalized. As noted in UNESCO's monitoring reports, public access issues, development pressure, and insufficient recreational areas along the shores of Lake Paranoá are among the fundamental problems weakening urban integrity (UNESCO, 2009; 2011). In this context, the proposed concept in Figure 8 aims to strengthen the physical and visual relationship between the lake and the city and increase user interaction with the water.

Within this scope, a pedestrian bridge connecting to the shore and adaptable modules for different functions have been designed. The modules have a flexible structure that can be rearranged according to changing usage scenarios and, in this respect, offer a dynamic usage potential that is an alternative to the static space understanding of modern planning. The triangular form was chosen to leverage this geometry's pressure resistance and structural stability, ensuring the modules can be used safely both on the water and along the shoreline. The market area and festival area have been designed using variable modules. The modules, which allow users to establish a physical and visual relationship with the water, have a structure that can be adapted to different scenarios and movements created in the x, y, z planes. The modules will be shaped according to the users in line with the actions.

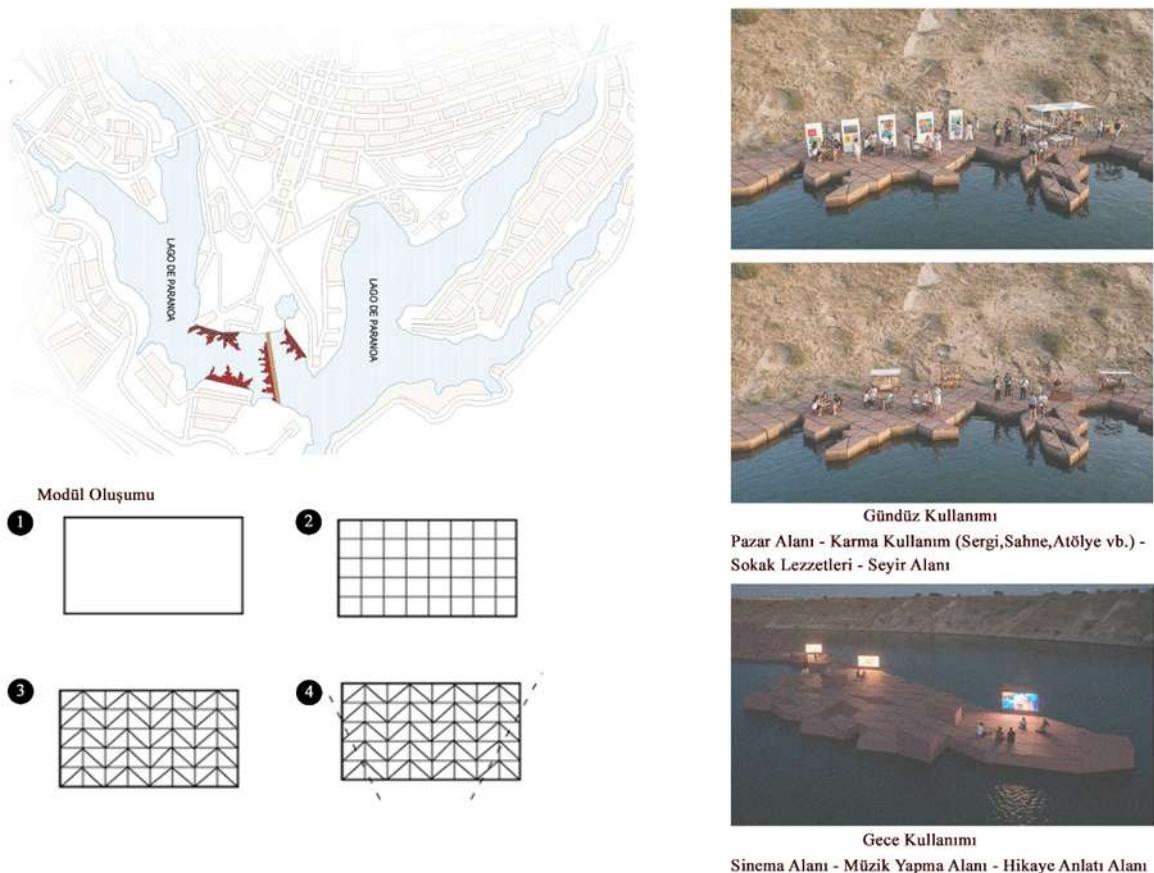


Figure 8. Conceptual spatial scenarios 1

The reason for designing the modules in a triangular shape is that they have a structure adaptable to different scenarios and movements created in the x, y, z planes. Additionally, the triangle's high resistance to pressure and its ability to remain stable under pressure as a polygon contributed to its selection as the form to be used in relation to water.

The vast open spaces around the Monumental Axis, while central components of Brasília's modern planning, have become dysfunctional and underutilized spaces today. UNESCO conservation reports emphasize that the weak public use of this axis reduces the spatial vitality and that the area needs to be re-evaluated in terms of urban integrity (UNESCO, 2012; 2023). Criticizing the fact that such a large area is dysfunctional (not visited by users), it has been proposed that the area be given a "CULTURAL AXIS" function that supports the Monumental Axis and explains Brasília's symbolic importance, history, how it was founded, and its important buildings. In this context, the area will feature various functions as seen in Figure 9, such as open exhibitions, display areas, amphitheater seating areas, parks for children, and more.

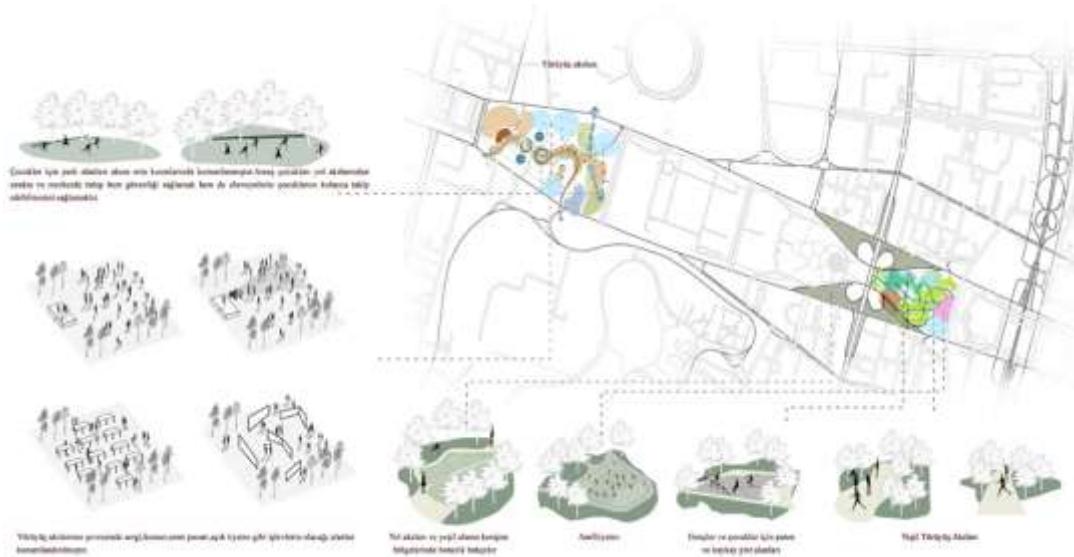


Figure 9. Conceptual spatial scenarios 2

The conceptual spatial scenarios developed in this context aim to reorganize superquadra units according to users' perceptual, spatial, and safety needs. The fundamental principles are to move parks and children's play areas away from vehicle traffic, reposition these areas in an integrated manner with pedestrian paths, and create spatial organizations that support parent-child interaction. This idea is illustrated in Figure 10. Taking children's eye level as a reference is consistent with modern child-friendly city approaches and aims to transform the space into an experiential area that supports children's cognitive and sensory development (Kyttä, 2004).



Figure 10. Conceptual spatial scenarios 3

Activity and play areas located at the intersections of the proposed pedestrian routes create safe public spaces and strengthen social interaction within the Superquadra. While the current lack of pedestrian paths and heavy vehicle traffic limit safe usage areas for children and adults, the concept arrangement offers a comprehensive approach aimed at solving these problems, which are illustrated in Figure 11. Thus, while preserving Brasília's modern planning heritage, the goal is to create a more inclusive and livable environment that meets the needs of contemporary urban life.



Figure 11. Conceptual spatial scenarios 4

In conclusion, modernism has created a radical transformation in the fields of architecture and urban planning since the beginning of the 20th century, promoting an approach that encourages functionality, simplicity, geometric order, and the use of new construction technologies. In this context, the spatial conception of modernism has produced powerful ideals in the direction of rejecting traditional urban forms and designing a new way of life. Brasília, designed by Lucio Costa and Oscar Niemeyer, holds a special place in both architectural history and cultural heritage as one of the most comprehensive and holistic examples of a modern city where these ideals were implemented. Its inclusion in the UNESCO World Heritage List confirms the city's exemplary nature in embodying modern principles on a large scale (UNESCO, 2023).

However, the modern planning principles applied since Brasília's founding have sparked various debates over time. The city's structure, based on rigid functional divisions, its spatial organization that necessitates car use, and its transportation system that relegates pedestrian movement to a secondary role have been criticized in terms of sustainability and livability. The spatial separation of residential, administrative, commercial, and recreational areas has led to the dispersion of daily functions over long distances and limited social interaction; this has made it particularly difficult for low-income groups to access urban life (Holston, 1989; Ferreira, 2015).

In an environmental context, the construction of Brasília has had significant impacts on the cerrado ecosystem. The clearing of large areas for urbanization has led to the loss of natural vegetation, a decline in biodiversity, and changes in the local water cycle. The artificial creation of Lake Paranoá provided advantages in terms of water management but also led to transformations in ecological processes; the pressure of construction around the lake has been highlighted as a threat in UNESCO reports (UNESCO State of Conservation Reports, 1993–2023).

The limited availability of recreational areas within the city, the loss of spatial experience in large-scale voids, and the lack of small-scale public spaces for everyday life are among the most significant problems of Brasília's modern design today. In this context, the conservation and improvement of conceptual spatial scenarios developed aim to preserve the city's modern heritage while also increasing spatial livability. Strengthening the relationship between Lake Paranoá and the land, designing modular systems adaptable to different uses, and creating pedestrian-oriented recreational areas around the lake are among the prominent approaches. The preference for triangular modules offers a functional solution in terms of both structural strength and flexible spatial arrangements.

The current state of the Superquadra units, which play an important role in the inner neighborhood organization of Brasília, is inadequate in terms of pedestrian movement and child-centered public spaces. The existing vehicle-oriented road system makes it difficult to move between blocks, and the location and design of parks are not suitable for safe use by children. The proposed design approach aims to reorganize public spaces, strengthen pedestrian and bicycle axes, and safely design parent-child interaction areas, particularly by focusing on children's perceptual scale. This approach constitutes an intervention that will reduce the disconnect between the modern urban unit and social life.

The dysfunctionality of the large-scale empty spaces around the Monumental Axis has caused the city's symbolic core to become disconnected from everyday use. Therefore, refunctionalizing the area as a "Cultural Axis" and supporting it with open exhibitions, event areas, child-focused spaces, and designs that increase public use will both enhance the visibility of the heritage and ensure the axis's integration into daily life.

Brasília can be seen as a comprehensive experiment in the urban lifestyle idealized by modernism; however, the social, environmental, and spatial problems that have emerged throughout history make it necessary to reinterpret this ideal in today's conditions. The sustainability of the city's UNESCO World Heritage status will be possible through planning policies that preserve its modern integrity while prioritizing user needs, strengthening ecological sensitivity, and enriching small-scale public spaces. This study has evaluated Brasília's modern heritage value from both theoretical and practical perspectives, revealing that sustainable conservation approaches can open new horizons for modern cities.

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