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Reconnecting landscapes: the Capibaribe Park planting system Project

Reconectando paisagens: o projeto do sistema de plantio do Parque Capibaribe

Reconectando paisajes: el proyecto del sistema de plantación del Parque Capibaribe

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RESUMO
A pesquisa que se apresenta debate a compreensão sistêmica da paisagem, que integra os aspectos naturais e culturais, para a concepção de projetos de paisagem de parques urbanos. Enquanto espaço que integra o meio urbano, o parque possui um potencial ecológico em virtude da sua predominância de elementos naturais, com ênfase para a vegetação, sobretudo parques lineares, por propiciar maior conectividade física e o fluxo gênico, quando utilizadas espécies adequadas à realidade local. Tendo como objeto empírico o projeto do sistema de plantio do Parque Capibaribe, foi empreendida uma pesquisa documental nos projetos executivos do parque, memoriais descritivos e no conjunto de diretrizes projetuais que constam no Plano Urbanístico de Recuperação Ambiental do Parque Capibaribe (TOMO IV). Assim, objetivou-se analisar os procedimentos para o uso da vegetação que compõem a Paleta Vegetal do projeto, formada exclusivamente por vegetação nativa da fitofisionomia local. Como resultado, constatou-se a potencialidade do uso da vegetação nativa como diretriz projetual, dialogando com a dimensão ecossistêmica da paisagem, fortalecendo o sistema de relações existentes entre os fatores bióticos, abióticos e fatores ambientais no meio urbano. Os resultados ainda evidenciam as implicações para o sistema natural da cidade, no aumento da biodiversidade local e na existência e salvaguarda dos ecossistemas associados ao bioma Mata Atlântica.
PALAVRAS-CHAVE: Projeto de Paisagem. Sistema de Plantio. Vegetação Nativa.

SUMMARY
The research presented discusses the systemic understanding of the landscape, which integrates natural and cultural aspects, for the design of urban park landscape projects. As a space that integrates the urban environment, the park has ecological potential due to its predominance of natural elements, with an emphasis on vegetation, especially linear parks, as it provides greater physical connectivity and gene flow, when species appropriate to the local reality are used. Taking the Capibaribe Park planting system project as its empirical object, documentary research was accomplished on the park's executive projects, descriptive notes and the set of design guidelines contained in the Capibaribe Park Environmental Recovery Urban Plan (TOMO IV). Thus, the objective was to analyze the procedures for use the vegetation that constitute the project's Vegetal Palette, formed exclusively by native vegetation of the local phytophysiognomy. As a result, the potential of using native vegetation as a design guideline was verified, dialoguing with the ecosystemic dimension of the landscape, strengthening the system of relationships existing between biotic, abiotic and environmental factors in the urban environment. The results also highlight the implications for the city's natural system, in terms of increasing local biodiversity and the existence and safeguarding of ecosystems associated with the Atlantic Forest biome.
KEYWORDS: Landscape Design. Planting System. Native vegetation.

RESUMEN
La investigación presentada discute la comprensión sistémica del paisaje, que integra aspectos naturales y culturales, para el diseño de proyectos paisajísticos de parques urbanos. Como espacio integrador del entorno urbano, el parque tiene potencial ecológico por su predominio de elementos naturales, con énfasis en la vegetación, especialmente los parques lineales, ya que proporciona mayor conectividad física y flujo genético, cuando se encuentran especies adecuadas a la realidad local. usado. Tomando como objeto empírico el proyecto del sistema de plantación del Parque Capibaribe, se realizó una investigación documental sobre los proyectos ejecutivos del parque, los memoriales descriptivos y el conjunto de lineamientos de diseño contenidos en el Plan Urbano de Recuperación Ambiental del Parque Capibaribe (TOMO IV). Así, el objetivo fue analizar los procedimientos de empleo de la vegetación que conforma la Paleta Vegetal del proyecto, formada exclusivamente por vegetación nativa de la fitofisonomía local. Como resultado, se constató el potencial de utilizar la vegetación nativa como pauta de diseño, dialogando con la dimensión ecosistémica del paisaje, fortaleciendo el sistema de relaciones existentes entre factores bióticos, abióticos y ambientales en el entorno urbano. Los resultados también resaltan las implicaciones para el sistema natural de la ciudad, en términos de aumento de la biodiversidad local y de existencia y salvaguarda de ecosistemas asociados al bioma de la Mata Atlántica.
PALABRAS CLAVE: Diseño del Paisaje. Sistema de plantación. Vegetación nativa.

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1 INTRODUCTION

The systemic understanding of landscape, which combines natural and cultural aspects into a complex whole, reflects the conformation of the urban environment and its constituent spaces, the result of a set of relationships over time that characterize and differentiate the various conformations of these spaces, such as the urban park. As such, the landscape requires a transdisciplinary approach, correlating different theoretical approaches to encompass its complexity (Besse, 2014), including design and the ecosystem. The urban park, a space that integrates the urban fabric and adds natural and cultural aspects to its design, reflects this understanding, where its prominence in the urban fabric is emphasized, both for its size and for its ecological potential due to the predominance of natural elements (Kliass, 1993; Sá Carneiro, 2010).

With a focus on establishing Recife as a city-park by 2037, the 500th anniversary of its foundation, the Capibaribe Park project was created as a result of an agreement between Recife City Hall (PCR) and the Federal University of Pernambuco (UFPE), whose executive member was the transdisciplinary research group INCITI - Research and Innovation for Cities, linked to the Laboratory of City Research Technologies - Lattice/UFPE. The park project, which is characterized as linear, is 42 km of extension along the Capibaribe River, considered to be an ecological corridor, which cuts through the city from east to west, and which connects directly with various open areas, such as parks, squares, historic gardens and Nature Conservation Units (UCN), forest remnants of the Atlantic Forest.

In this context, the design of the planting system stands out as a strategic element in promoting physical and biotic connectivity, by proposing that the project's Plant Palette consists of native species characteristic of Recife's phytophysiognomy, of the Lowland Dense Ombrophilous Forest vegetation type, of the Atlantic Forest biome, covering four plant strata: arboreal, shrub, liana and herbs. Therefore, the park's floristic composition sheds light on the discussion of landscape intervention design practices that encourage overcoming the dichotomy between human beings and nature by reactivating local ecosystem relationships, contributing to local biodiversity and acting as a potential restorer of ecosystem processes impacted by human action in cities.

Thus, landscape design consists of an action that describes and invents the territory in a unique way, being a highly customized process (Corajoud, 2002; Corner, 2010; Besse, 2014). In this way, the inventive act is structured in pre-existence, through in situ analysis, based on local data. In this way, I project that the landscape of a linear urban park is privileged in the search for solutions aimed at bringing the city and nature closer together. The challenge of combining the diversity of occupation profiles, equipment and proposed use, physical and environmental characteristics, political and social demands, symbolic and historical aspects, which will be reflected in the design of the planting system in an urban park landscape project.

Taking the Capibaribe Park planting system project as an empirical object, this article aimed to outline the procedures for implementing the vegetation that makes up the Plant Palette in the executive design of the Capibaribe Park planting system in four executive sections designed by INCITI's team of designers in accordance with the established Plant Palette: (i)

Periódico Técnico e Científico Cidades Verdes
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Jaqueira-Jardim do Baobá; (ii) Baobá-Ponte da Torre; (iii) Graças; and, (iv) Capunga-Derby.

2 UNDERSTANDING NATURE IN THE PLANTING SYSTEM OF THE CAPIBARIBE PARK PROJECT

Given the scale of the park project, it was necessary to delve deeper into understanding Recife's territory, looking at the structuring element of the project, the Capibaribe River and its associated ecosystems. To this end, a political-administrative division was structured, the Capibaribe Macrozone (MCZ of Capibaribe), which according to Silva, Meneses, Mota (2021, p. 286, our translation) was "defined based on the boundaries of the Capibaribe River basin and the city's main roads, covering approximately 1/3 of the territory (7,808ha) [...]"[1] (Figure 1).

Figure 1 – Location of the Capibaribe River MCZ

Fonte: Silva, Meneses, Mota (2021, p. 284)

The Capibaribe MCZ is subdivided into Ecological Corridors (Capibaribe River and tributaries), Environmental Corridors and the Park Zone where the closer it gets to the ecological corridor, the more restrictive the design guidelines become, allowing for the applicability of the guidelines observed in the Capibaribe Park Urban Environmental Recovery Plan (PURA Capibaribe), which brings together design guidelines, actions and goals to guide the preparation and development of park projects. Articulated in the Capibaribe MCZ are cultural and natural heritage representatives, such as 10 of the city's 25 UCNs, which are directly linked to the Capibaribe River, demonstrating the significance of this natural element for the city and as a force line in the landscape.

The Park Zone, which is equivalent to the Buffer Zone, is the region of the territory that surrounds the Capibaribe River and where the project's interventions will be structured, involving processes of environmental recovery, socio-spatial integration and a new mode of

[1] "definida com base nos limites da bacia do Rio Capibaribe e de eixos viários principais da cidade, engloba aproximadamente 1/3 do território (7.808ha) [...]" Silva, Meneses, Mota (2021, p. 286).

Periódico Técnico e Científico Cidades Verdes
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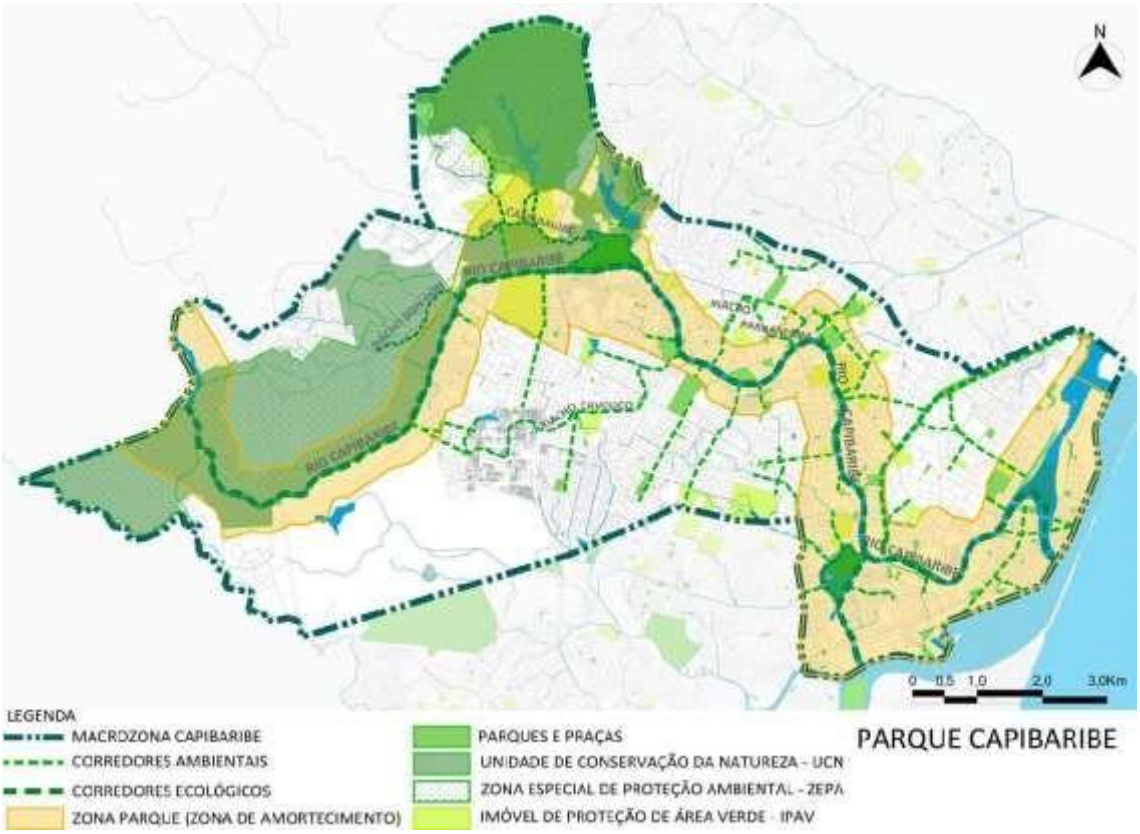
active mobility (Silva, Meneses, Mota, 2021). According to Law 18.014/2014[2], which establishes the Municipal System of Protected Areas (SMUP Recife), within the scope of the City of Recife, the Buffer Zone is understood as "the surroundings of a conservation area, where human activities are subject to specific rules and restrictions, with the aim of minimizing negative impacts on the area" (Recife, 2014, p. 3, our translation)[3].

Figure 2 – Subdivisions of the Capibaribe MCZ and the articulation between the city's open spaces



Fonte: Silva, Meneses, Mota (2021, p. 289).

Faced with the complexity of using vegetation in the Capibaribe Park project, it was necessary to draw up a Plant Palette, which had its data drawn up by the Botany Applied to Landscaping - Capibaribe Park (2018-2019) research projects of the INCITI - Research and Innovation for Cities research group linked to the City Research Technologies Laboratory - Lattice/UFPE. According to Silva, Meneses and Mota (2021), bibliographic and documentary research was carried out on theses, dissertations, scientific articles and technical reports to build the Plant Palette, with emphasis on the productions of Dom Bento Pickel and Dárdano de Andrade-Lima from the early 20th century, where the data obtained shows a certain stability in the presence of plant individuals in the forest fragments of the city of Recife. In this way, it

[2] http://licenciamentoambiental.recife.pe.gov.br/sistema-municipal-de-unidades-protegidas-smup. Accessed: Feb. 21, 2022.

[3] "o entorno de uma unidade de conservação, onde as atividades humanas estão sujeitas a normas e restrições específicas, com o propósito de minimizar os impactos negativos sobre a unidade" (Recife, 2014, p. 3).

Periódico Técnico e Científico Cidades Verdes
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became possible to preliminarily list 523 species for the Plant Palette, to which seven criteria were applied, namely: "(i) ability to withstand urban environments; (ii) having a high or low Importance Value Index (IVI%); (iii) no toxicity; (iv) absence of aculei or thorns; (v) potential for reducing the temperature of the local microclimate; (vi) covering all levels of ecological group; and (vii) landscape potential" (Silva, Meneses, Mota, 2021, p. 290-291, our translation)[4], the latter being subjective.

Applying the criteria, we came up with 192 species covering 53 botanical families and 132 botanical genera. Among the families catalogued, the most significant are: "Fabaceae (34); Bromeliaceae (12); Poaceae and Asteraceae (9) each; Rubiaceae, Melastomataceae, Bignoniaceae and Convolvulaceae (8) each; Anacardiaceae (7) and Passifloraceae, Malvaceae and Sapindaceae (5) each" (Silva, Meneses, Mota, p. 291, 2021, our translation)[5]. The numbers reported show a great diversity of species, adding to the issue of biodiversity, which is fundamental to the project, in which the use of these species "will strengthen the ecosystem on the banks of the River Capibaribe, where the significant presence of exotic, invasive and aggressive plant species distances the logic of ecology and the understanding of the local landscape, that is, the identity of the place" (Silva, Meneses, Mota, p. 283, 2021, our translation)[6].

The vegetation proposed in the project is made up of native species exclusively from the Recife vegetation type Ombrophilous Dense Lowland Forest, which according to Silva, Meneses, Mota (2021) is justified by Municipal Decree No. 23,809 of July 23, 2008, which regulates the Special Environmental Protection Zone 2 (ZEPA) - Capibaribe River Estuary, in accordance with Federal Law No. 9. 985/2000, which establishes the National System of Nature Conservation Units (SNUC), which states in article 4, item I, that the aim of this law is to "contribute to the maintenance of biological diversity and genetic resources in the national territory and in jurisdictional waters" (BRASIL, 2000, p. 45, our translation)[7], as well as Law no. 17,788,000, which establishes the National System of Nature Conservation Units (SNUC), as well as Law 17.666/2010, which regulates urban afforestation in the municipality of Recife.

Among the species in the Capibaribe Park project's Plant Palette, 101 species are classified as having the Zoochory dispersal syndrome, including trees, shrub, lianas and herbs. In other words, approximately 53% of the species have animals as their dispersal agent, which suggests that once these species are introduced into the urban environment through the park project, they will act as an attraction for the local fauna. With regard to ecological groups,

[4] "(i) capacidade de suportar ambientes urbanos; (ii) possuir elevado ou baixo Índice de Valor de Importância (IVI%); (iii) não possuir toxicidade; (iv) ausência de acúleos ou espinhos; (v) potencial para redução da temperatura do microclima local; (vi) contemplar todos os níveis de grupo ecológico; e (vii) potencial paisagístico" (Silva, Meneses, Mota, 2021, p. 290-291).

[5] "Fabaceae (34); Bromeliaceae (12); Poaceae e Asteraceae (9), cada; Rubiaceae, Melastomataceae, Bignoniaceae e Convolvulaceae (8) cada; Anacardiaceae (7) e Passifloraceae, Malvaceae e Sapindaceae (5) cada" (Silva, Meneses, Mota, p. 291, 2021).

[6] "irá fortalecer o ecossistema das margens do Rio Capibaribe, onde a presença significativa de espécies vegetais exóticas, invasoras e agressivas, afasta a lógica da ecologia e do entendimento da paisagem local, ou seja, da identidade do lugar" (Silva, Meneses, Mota, p. 283, 2021).

[7] "contribuir para a manutenção da diversidade biológica e dos recursos genéticos no território nacional e nas águas jurisdicionais" (BRASIL, 2000, p.45)

Periódico Técnico e Científico Cidades Verdes
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according to Gandolfi et al., 1995 and Ferretti et al., 1995 (*apud* Silva, Meneses, Mota, 2021), the classification considered the following groups: (i) Pioneer; (ii) Early Secondary; (iii) Late Secondary; and (iv) Climax. Among the species in the project, there are 60 species are classified as Pioneer, 43 species as Initial Secondary, 27 species as Late Secondary, 7 species as Climax, 17 species have no classification and finally, 3 species assume the condition of generalist. The lack of studies on Recife's native vegetation denounced by Silva, Meneses and Mota (2021) had an impact on the research for the plant palette, when it was observed that 35 species had no data on their ecological group.

Along the banks of the Capibaribe River, within the urban environment of Recife, the presence of 43 species of native Brazilian vegetation and 31 species of exotic vegetation has been inventoried (Zickel et al., 2019 *in* Monteiro, Filho, Cunha, 2019). Of the inventoried native species present on the banks of the Capibaribe River, only 13 conform to the vegetation palette of the Capibaribe Park. These are: (i) Spondias mombin L.; (ii) Anacardium occidentale L.; (iii) Inga ingoides (Rich.) Willd.; (iv) Inga capitata Desv.; (v)Handroanthus impetiginosus (Mart. ex DC.) Mattos; (vi) Genipa americana L.; (vii) Licania tomentosa (Benth.) Fritsch; (viii) Trema micrantha (L.) Blum. (ix) Citharexylum pernambucense Moldenke heterotypic of Citharexylum myrianthum Cham.; (x) Schinus terebinthifolius Raddi homotypic of Schinus terebinthifolia Raddi; (xi) Laguncularia racemosa (L.) C.F.Gaertn.; (xii) Rhizophora mangle L.; and, (xiii) Avicennia schaueriana Stapf & Leechm. ex Moldenke.

When comparing this data with the number of species in the proposed Plant Palette, it was found that approximately 7% of the species inventoried are classified as native to the Recife phytophysiognomy, and that there are 61 species that are not native to Brazil or do not occur in the Atlantic Forest of the local phytophysiognomy. This corroborates the contributions of Oliveira et al. (2020), who, after evaluating the vegetation present in public open areas and forest remnants in Recife's Atlantic Forest, identified a significant number of exotic tree species.

The emphasis on the use of local native vegetation is in line with the Recife SMUP, mentions that the aim of this law is to “contribute to the preservation and restoration of the diversity of municipal natural ecosystems” (Recife, 2014, chapter II, article 4, our translation)[8]. Thus, the Capibaribe Park project established the Capibaribe River as an ecological corridor, for being a natural structuring element of the Recife landscape and for contributing to the physical connection, guaranteeing a continuous strip for gene flow through vegetation, where it represents “[...] strips of territory that enable the landscape integration of vegetated spaces and promote the respective genetic exchange of fauna and flora populations” (Recife, 2014, chapter I, article 2, our translation)[9]. This would make it impossible to propose exotic species for the project's Plant Palette.

3 METHODOLOGY

[8] “contribuir para a preservação e a restauração da diversidade de ecossistemas naturais municipais” (Recife, 2014, cap. II, art. 4).
[9] “[...] faixas de território que possibilitam a integração paisagística de espaços vegetados e promovem o intercambio genético respectivo das populações da fauna e da flora” (Recife, 2014, cap. I, art. 2).

Periódico Técnico e Científico Cidades Verdes
Technical and Scientific Journal Green Cities
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Edição em Português e Inglês / *Edition in Portuguese and English* - Vol. 12, N. 37, 2024

The documents of the executive projects of the four aforementioned sections, such as urban plans, planting system plans and executive memorials, were analyzed. The analysis allowed us to understand the use of vegetation in the planting system project, observing its executive aspect in four executive sections: (i) Jaqueira-Jardim do Baobá, with an area of 22,675.10 m²; (ii) Baobá-Ponte da Torre, with an area of 14,790.00m²; (iii) Graças, with an area of 25,636.47m²; and, (iv) Capunga/Derby, with an area of 24,476m².

The intervention area for the Capibaribe Park project has different forms of occupation. An in situ survey was therefore carried out along the banks to identify the different environmental profiles. The assessment of existing constraints was based on physiographic aspects (existing vegetation, topography, tidal regime), physical barriers or limitations (buildings adjacent to the park or roads with a flow of motorized vehicles with a pedestrian lane), as well as identifying the area of the banks with conditions for implementing the infrastructure that makes up the park. The data was used to draw up the guidelines for urban planning and landscaping projects for Capibaribe Park, which compose PURA Capibaribe - TOMO IV, which guides the use of vegetation in the project.

By systematizing the information in the documents, it was possible to understand the dynamics of the use of native vegetation in the project's Plant Palette and its understanding of the ecosystem dimension of the landscape, in the use and combination of the various demands that affect the landscape design of urban parks.

4 THE CAPIBARIBE PARK'S PLANTING SYSTEM PROJECT

The Capibaribe Park planting system was designed in accordance with PURA Capibaribe, with the aim of establishing connections between the city's open spaces and the environmental recovery of the river and its associated ecosystems, through the use of local native vegetation as a strategic element for promoting biotic connections. Analyzing the data relating to the executive projects of the planting system in the sections that comprise the research, one of the design guidelines stands out, which aims to encompass all the species of the plant palette, distributed throughout the project, as a green system, in order to contribute to local biodiversity. The guidelines also include: (i) strengthen native resources by reintroducing species native to Recife's phytophysiognomy; (ii) seek to insert vegetation by creating a spontaneous aspect, which allows the natural behavior of the individual plant, associating whenever possible the strata comprised in the palette, minimizing the ordering of the gardens; (iii) associate species from different ecological groups, giving priority to Pioneer and Late Secondary species due to their potential for perpetuation; (iv) use species whose dispersal agent is animals (zoocory); (v) use plant species that are on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, which includes 83 species from the project's Plant Palette (Inciti/UFPE, 2020).

A total of 94,024 species were projected in the four sections studied, encompassing the tree, shrub, liana and herb strata, representing approximately 1.07 plant individual per

Periódico Técnico e Científico Cidades Verdes
Technical and Scientific Journal Green Cities
ISSN 2317-8604 Suporte Online / Online Support
Edição em Português e Inglês / *Edition in Portuguese and English* - Vol. 12, N. 37, 2024

square meter of the intervention area. Added to this figure is 5,248m² of lawn area. Among the habits, 552 trees, 63,877 shrub, 12,970 lianas and 16,625 herbs were projected, where the latter does not include the species used for grass covering, since its quantity is per square meter of implantation, for executive and commercial reasons. Although the number of trees represents 48% of the total number of species that make up the plant palette of the park project, trees have a smaller number of projects due to their physiological and architectural aspects, which require a certain infrastructure for their insertion.

With regard to botanical families, 36 families were included out of a total of 53 families that make up the plant palette. The most significant numbers of species designed are: Fabaceae (26%); Asteraceae (16%); Plumbaginaceae (15%); Convolvulaceae (14%); Turneraceae (7%); Rubiaceae (7%); Heliconiaceae (5%); Bromeliaceae (5%) (Figure 3). The presence of the botanical family Poaceae is noteworthy, as the species is used as fodder in all the stretches. With regard to ecological groups, the classification proposed by Gandolfi et al. and Ferreti et al. (1995 *apud* Silva, Meneses, Mota, 2021) was applied to the plant palette of the park project. The authors established four classification criteria: Pioneer, Early Secondary, Late Secondary and Climax (Figure 4). Among the projected species, the Initial Secondary ecological group stands out, corresponding to approximately 58.9%. According to the description presented by Silva, Meneses, Mota (2021, p. 291, our translation), the ecological group classifications can be described as:

> (i) Pioneer: light-dependent species that grow very quickly; (ii) Early Secondary: species that occur in conditions of medium shade or not very intense light and grow quickly; (iii) Late Secondary: species that develop in light or dense shade and can remain in this environment for their entire lives and grow at a medium rate; and (iv) Climax: species that develop completely in shaded conditions and grow slowly.[10]

Figure 3 – Botanical families with the greatest representation among the species projected in the Jaqueira-Derby executive sections

[10] (i) Pioneira: espécies dependentes de luz e que possuem um crescimento muito rápido; (ii) Secundária inicial: espécies que ocorrem em condições de sombreamento médio ou luminosidade não muito intensa e apresenta crescimento rápido; (iii) Secundária tardia: espécies que se desenvolvem sob sombra leve ou densa, podendo permanecer neste ambiente por toda a vida e tem seu crescimento considerado médio e (iv) Clímax: cujo desenvolvimento se dá completamente em condições de sombreamento possuindo um crescimento lento (Silva, Meneses, Mota, 2021, p. 291).

Periódico Técnico e Científico Cidades Verdes
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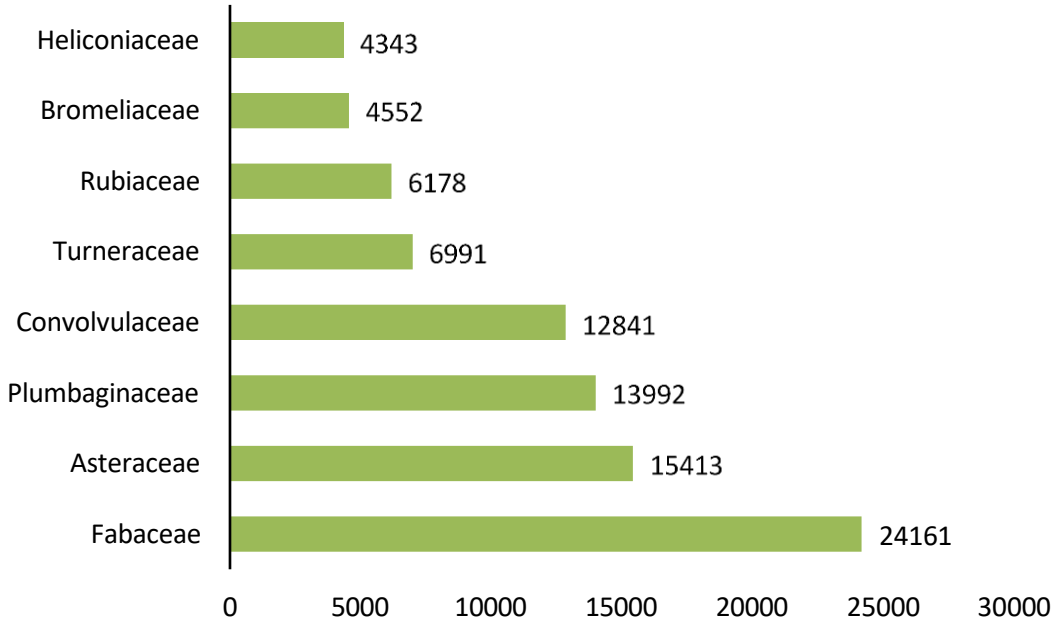
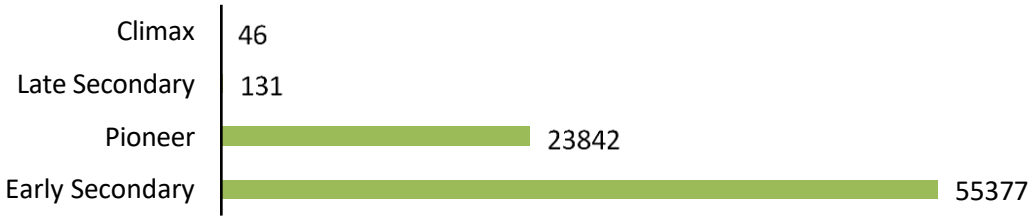


Source: Elaborated by the author.

Figure 4 – Ecological groups with the greatest representation among the species projected in the Jaqueira-Derby sections



Source: Elaborated by the author.

Another criterion assessed in the design of the Capibaribe Park planting system was the Biological Dispersal Syndrome, which refers to the processes involved in the genetic dispersal of plant individuals from the parent individual. The project's plant palette included the following dispersal syndromes: Anemochory, Autochory, Barochory, Hydrochory and Zoochory. The importance of the latter for the design of the planting system in an urban park is highlighted, as it allows the attraction of animal species, , especially birdlife.

Among the projected species, the number of Anemochoric, Autochoric and Zoochoric syndromes stands out, representing 80% of the species included in the four sections (Jaqueira-Derby), while the remaining 20% are distributed among the Barochoric, Hydrochoric syndromes, as well as species that do not have data available in the bibliography consulted. An in-depth analysis of the projects studied revealed that the Zoochoric syndrome comprised approximately 60% of the plants inserted, followed by the Autochoric syndrome with approximately 20% and the Anemochoric with 3% (Figure 5). In this way, the inclusion of a majority of species from the Zoochoric syndrome, in which dispersal is carried out by animals, will act as an attraction for fauna, strengthening the project's ecological corridor, the

Periódico Técnico e Científico Cidades Verdes
Technical and Scientific Journal Green Cities
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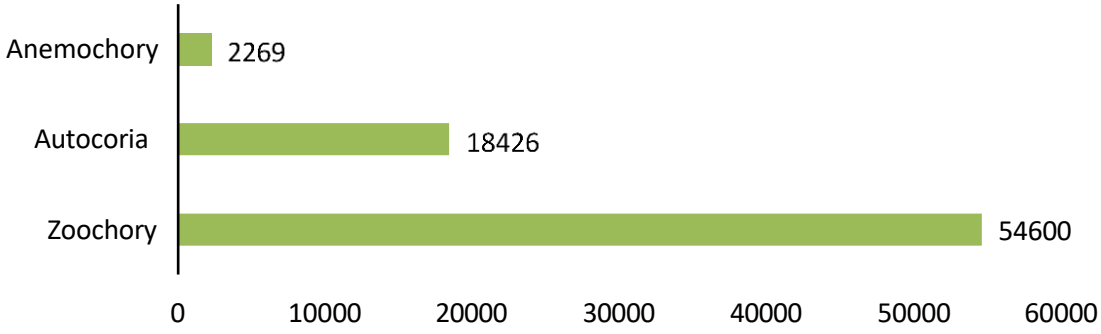
Edição em Português e Inglês / *Edition in Portuguese and English* - Vol. 12, N. 37, 2024

Capibaribe River, its associated ecosystems and the connection between the Atlantic Forest remnants and other representative green areas present in the city of Recife.

Figure 5 –Dispersal syndromes with the greatest representation among the species projected in the Jaqueira-Derby sections



Source: Elaborated by the author.

The aspects observed, such as the Diversity of Families, Ecological Groups and Dispersal Syndrome of the projected species, were facilitated by the criteria established primarily in the construction of the project's Plant Palette, which demonstrate the biodiversity promoted by the project. Added to these aspects are the strategic guidelines derived from an understanding of the different environmental profiles along the banks of the River Capibaribe.

more in-depth analysis of the executive design demands revealed the need to relate, in a more specific way, executive aspects relating to the project and their impact on the decision-making process regarding the choice of plants designed for the sections, in accordance with the criteria listed above. As the guidelines for drawing up urban planning and landscaping projects for Capibaribe Park are suggestions and notes applicable to the entire Park Zone, they have become key criteria for the use of vegetation in the executive sections. The key criteria include: (i) Use species exclusive to the Vegetal Palette (vegetation type Lowland Ombrophilous Dense Forest of the Recife phytophysiognomy); (ii) Include as many species from the vegetal palette as possible; (iii) Insert plant energy - the spontaneous nature of the planting rather than ornamentation; (iv) Restore the mangrove vegetation, prioritizing the species Avicennia schaueriana (black mangrove) and Rhizophora mangle (red mangrove); (v) Ensure visibility for the waters of the Capibaribe River; (vi) Cover the four plant strata (herbs, lianas, shrubs and trees); (vii) Observe the different environments along the banks and the use of appropriate vegetation for each case; (viii) Use of ground cover and herbaceous species as a strategy to contain existing and projected slopes; (ix) Prioritize the introduction of species from the Pioneer and Early Secondary ecological groups; (x) Prioritize the use of species classified on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species; and (xi) Prioritize the use of species with a zoochoric dispersal syndrome (Inciti/UFPE, 2020).

Based on the key criteria in the Capibaribe Park design guidelines document, there are guidelines that encompass aspects relating to the characteristics and dynamics of plant individuals in their physiological aspects, which correlate the criteria of diversity of botanical families, ecological groups and dispersal syndrome, as well as the profile of occupation of the

Periódico Técnico e Científico Cidades Verdes
Technical and Scientific Journal Green Cities
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Edição em Português e Inglês / *Edition in Portuguese and English* - Vol. 12, N. 37, 2024

bank observed in each executive section. The guidelines for listing the species in each executive section are based on executive aspects, which are aspects relating to the characteristics of the implementation site. The executive aspects are: (i) Relative to the size of the planting site; (ii) Relative to the interaction of the associated plant individuals; (iii) Relative to locations with no flow of users; (iv) Relative to the type of soil at the planting site; (v) Relative to the insolation of the planting site; (vi) Relating to the layout of the project's equipment, furniture and living spaces; (vii) Relating to locations with a flow of users (sidewalks, driveways and bike lanes) and environmental corridors; and, (viii) Relating to the type of exposure of the planting site (waterfront environment or motorized road environment).

The executive aspect relating to the size of the planting site (alleys, free sites, projected slopes, etc.) has an impact on the direction of the vegetation, the choice of species with an appropriate size (small, medium or large), a compatible root system, the architecture of the individual plant and whether it behaves in different strata (grass, liana, shrub and tree). With regard to the interaction between plant individuals, the parameter of choice is the insertion of the four strata available in the plant palette in order to guarantee the full development of the species, also observing issues of allelopathy between the associated individuals. With regard to the more isolated parts of the executive sections, where there is no indication of pedestrian, cyclist or other user traffic, prioritize the use of species that have aculei, fruits or seeds of considerable size, avoiding accidents due to their falling trajectory.

As for the executive aspect, which looks at the type of soil on the site, given the different patterns of use and occupation of the banks of the River Capibaribe, there are areas subject to interaction with the flow of the tides, permanently flooded areas, as well as areas where the soil does not receive this influence, with firmer soil. Therefore, the species listed must be adapted to the type of soil in the area. A similar executive aspect is that relating to the insolation of the planting site, which relates to the issues of ecological groups, where the species must be suitable for full sun, half shade or shade. In places where there are a large number of individuals generating shade on the site, prioritize the use of arboreal individuals that have a rarefied crown architecture and smaller leaf size, prioritizing the insertion of shrub, liana and herb strata. However, in places where there is intense sunlight, prioritize the use of species from the Pioneer or Early Secondary ecological groups, with dense canopy architecture and significant leaf size.

As for the layout of equipment, furniture and living spaces, ensure the use of species that promote thermal comfort on site, trees with a more regular trunk architecture, as well as observing the use of liana and shrub layers, so as not to compromise the visual continuity between the living spaces and the surroundings. The executive aspect, which deals with places with a flow of users and environmental corridors, requires the use of plants that provide high levels of shade. Another point of observation is visual continuity, ensuring safety when moving around, observing the use of species from the shrub and liana strata, prioritizing the use of species with regular trunk architecture, in order not to generate undesirable physical contact and to guarantee full flow throughout the project, in the various forms of mobility. Finally, the executive aspect, which is related to the type of exposure of the planting site, deals with the

Periódico Técnico e Científico Cidades Verdes
Technical and Scientific Journal Green Cities
ISSN 2317-8604 Suporte Online / Online Support
Edição em Português e Inglês / *Edition in Portuguese and English* - Vol. 12, N. 37, 2024

use of plant individuals that are resistant to the conditions of the environment, for example, in the case of vegetation inserted in places exposed to pollutants, such as sidewalks on roads with a flow of motor vehicles.

The observation of the executive aspects, based on an in situ assessment, that is, the understanding of the site, made it possible to list plant individuals with a view to promoting their greater adaptability and perpetuation in the project and in the city ecosystem. Using the site to guide the project's action proved to be essential, since "each project is a particular circumstance in which external data penetrates freely" (Corajoud, 2002, p. 120, our translation)[11]. In this way, the strengthening of native natural elements, especially vegetation, reinforces the importance of understanding the landscape's ecosystem.

5 CONCLUSION

As this is an intervention in Recife's landscape, with the reintroduction of native vegetation as a biotic connection strategy between open spaces and forest remnants along the ecological corridor, the Capibaribe River, we can allude that, with the maturity of the Capibaribe Park project, meeting the demands and criteria established, it is possible to envision the transformation of the City of Recife into a park city. The complexity of an urban park landscape project is mainly due to its combination of natural elements, especially native vegetation, and its ecological potential, especially in a contemporary world where climate issues are imperative in discussions about the urban environment.

This complex coexistence of different landscape realities points to the role of the landscape designer as a reconciler and actor in the transformations of the territory (Corner, 2010; Besse, 2014). In this way, the project must look for aspects in the intervention site that will reflect the paths to be pursued, taking into account aesthetic, identity, social and ecological functions. The Capibaribe Park planting system project emerges as a reflection of understanding nature in order to design. The complex mission of combining the different aspects and guidelines for decisions on the insertion of vegetation in the project highlights the importance of studies and research aimed at understanding the native vegetation of each place, knowing that these can contribute to the development of projects aligned with the ecological function. We know that the use of native species has certain challenges, due to the lack of availability for purchase in specialized locations, where the predominant culture values exotic ornamental vegetation.

Another factor is the low volume of studies on the use of native vegetation in planting projects, which has social implications, such as the lack of identification and representativeness of these species by people, especially in urban areas, which leads to large parts of these species being identified as "spontaneous", with low ornamental and ecological value. It also has ecological implications, since these native species are adapted to the place and contribute to biodiversity, where they play a fundamental role in the city's natural system.

[11] "*cada proyecto es uma circunstancia particular em que los datos externos penetran libremente*" (Corajoud, 2002, p. 120).

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Edição em Português e Inglês / *Edition in Portuguese and English* - Vol. 12, N. 37, 2024

With the Capibaribe Park project, we can see a movement towards heritage education about Recife's native vegetation, as well as an understanding of nature as a starting point for the development of landscape projects, based on the ecosystem dimension of the landscape.

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