

# Green and blue infrastructures as a model of sustainable urban planning – Landscape Design for *Praça de Espanha* in Lisbon - Portugal

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## Keywords

*Smart Cities; Blue and Green Infrastructures; Landscape Structure; Multifunctionality; Praça de Espanha; Landscape Design;*

## Abstract

The speech about Smart Cities includes a discourse where the sustainability of cities is unavoidable. Blue and green infrastructures (BGI) have a great role in cities sustainability because they offer feasible and valuable economic, social and environmental solutions for urban areas facing the challenges of climate change such as cloudbursts and droughts. BGI connects urban hydrological functions with urban nature, landscape design and planning. Thereby using the landscape systems namely blue (water) and green (vegetation) to protect against flooding and assure soil permeability among others. Within the BGI framework we propose a landscape design to *Praça de Espanha* in Lisbon. This landscape design is based on landscape systems (water, topography, vegetation, circulation (mobility)) and it is part of a continuous and productive landscape structure promoting the occurrence of ecologic, economic and social processes.

The proposed landscape design is in line with the policies and strategies for the ecological and sustainable development strategies that Lisbon has promoted and that it is included in the smart cities principles and orientations. This landscape design promotes social inclusion where human and ecological, physical and functional connectivity are articulated promoting different types of leisure and activities, through urban space polyvalence, multifunctionality and permeability (in all senses). This design proposal combines and includes natural, ecological and heritage values as well as the cultural heritage of the place itself.

Always with an ecological purpose we designed with a systemic and interconnected approach: water, topography, circulation (mobility), vegetation (creating spatiality: full/empty, light/shadow, close/open), cultural, aesthetic and poetic values, and community (as a participatory element and fundamental on the design process) promoting various functions (leisure, sports, protection and production) and creating a multifunctional landscape space, that reinforces and becomes part of the city BGI. This multifunctional landscape structure is fundamental for the sustainable development of cities, enabling a real-time response to environmental changes but also to the preservation and valuation of cultural values, heritage and identity, aesthetic concerns and leisure. It also enables partnerships among local government, civil society, communities and private sector.

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## 1. Introduction

The concepts that have emerged as those that regulate the modern city are all anchored to the concept of sustainability. To state but a few examples, we can begin with the concepts and notions of *smart cities*, *green infrastructures*, *landscape structures*, *blue and green infrastructures*, *landscape urbanism* and

*green urbanism*, to state but a few. These concepts determine the landscape and the system of open spaces, as well as the importance they now have, and have always had, in the construction of a city, in order to create balance, identity and experience. They constitute real potential for the development of a city, and should therefore be seen as spaces of urban cohesion, which are fundamental in order to contrast with built-up spaces. They are also essential to building a relationship between urban areas and their surroundings in ecological, aesthetic, cultural, social, economic and technological terms.

In this search for new strategies to promote sustainable development in cities, several authors argue that a continuous and structuring fabric should be implanted in open spaces, from which a landscape would then emerge as the fundamental structure of this *continuum*, its guiding principle being a systemic view of the landscape. A lot of implicit information is contained within the practice of the philosophy of landscape architecture, from the first public parks designed by Olmsted to the concept of *continuum naturale*, which was introduced and developed in Portugal in the mid-twentieth century. This movement encompasses every project that includes concepts of green corridors and green or ecological structures, all of which are essential, since they allow for ecological processes to take place, which, in turn, are fundamental to the growth of the city and its sustainable development (Matos, 2011).

The recent movements mentioned above, which have arisen from a rekindling of environmental and ecological concerns; the growth of tourism and everything that comes along with it; a sense of oneness and a combined entity; as well as the impact that the massive growth of cities has had on rural areas, have all led to the landscape being proposed as a model for urbanism, where there is a recommendation to integrate public landscapes with systems of infrastructure, formalising and guiding urban developments, as with Frederick Law Olmsted's Central Park, where the landscape shaped the city (Beveridge and Rocheleau, 1998). When it comes to these lines of thought, references are often made to the aesthetic, social, ecological, economic and cultural components and, consequently, to the functioning of protection, production and recreation, that is, the multifunctionality inherent in the landscape.

The project proposed herein for the Praça de Espanha Park is an example of this multifunctional, aesthetic, social, ecological, economic and cultural approach, combining the concepts mentioned above that are inherent to sustainability. This proposal considers the landscape as a model for urbanism, gaining inspiration from world-renowned parks such as Central Park in New York or Castlecrag in Sydney, encompassing large-scale organisational, conceptual, cultural and ecological features. Its conceptual boundary is extended to urban areas and infrastructures, reflecting a deep connection between the landscape and urbanism, ecology and infrastructure.

This project seeks to span multiple dimensions within the concept of landscape (which coincide with the pillars of sustainability), specifically the ecological and cultural dimensions. This leads to multiple understandings of design as an ecological (natural) and cultural (construction) system, which is in a constant state of change. In this conceptual framework, the ecological structural unit is more than a set of natural occurrences that are fundamental to the ecological balance of the landscape - it is a fundamental element when seen from an existential point of view, as being a driver of imagination, creation and construction. In terms of the ecological dimension, the geophysical and biological support structures of the present systems were evaluated, and the concept of Landscape Ecological Structure adopted, which can be understood as spatial expression in a determined area, resulting from the interaction of visible (relief, soil, water and vegetation) and invisible (subsoil, fauna and climate) environmental factors (Magalhães, 2007). In terms of the cultural dimension, historical factors were considered, bearing the evolutionary dimension in mind - human actions and activities that continuously transform the landscape, also focusing on the study of identity and the narrative dimension of the landscape. Including the community as a participatory and determining element of spatial design also leads to the way in which the population reads and interprets the space establishing a connection with their memories, needs and culture.

## **2. Bibliographic Review**

The guiding concepts for the proposal drawn up for the design of the Praça de Espanha Park are related to, whether directly or indirectly, and made up of key references in landscape planning, urban planning and

open space design (Ahern, 1995; Fábos and Ryan, 2006), as well as in the establishment of ecological networks (Jongman and Pungetti, 2004). Since the 2000s, Green Infrastructure and BCI currents (Gill et al., 2007; Kazmierczak and Carter, 2010) have primarily been introduced to design and promote urban green bodies as a coherent environmental and cultural planning system (Sandström, 2002; Thomas and Littlewood, 2010) and it can be considered that it includes all natural, and semi-natural components of environment around, within, and between urban areas. Landscape Structures (Matos, 2011) introduces the concept of a *Multifunctional Landscape*, including protection, recreation and production, as well as culture and the aesthetic and poetic dimension of both natural and ecological continuity. The landscape also takes on a central meaning and importance in *Landscape Urbanism*. Waldheim (2006) coined the term to describe the practices of many professionals for whom landscape replaced architectural form as the first means of designing a city. This understanding of a decentralised post-industrial urban form highlighted the abandoned voids of cities as potential material. Waldheim saw *landscape urbanism* as a conceptual interstitial subject, which operates in spaces between buildings, infrastructure systems, and ecological systems. In this context, landscape urbanism does not differ from the concepts that have already been mentioned, in fact, it becomes a useful lens through which we see the vague, residual and invisible terrain which was previously used by artists such as Robert Smithson or advocated as marginal spaces worthy of attention by architect Solà-Morales (1995).

If we look back at the history of landscape architecture, starting at the industrial revolution when the issue of hygiene and the need for open spaces first came about, it can be observed that Frederick Law Olmsted's proposals for Emerald Necklace in Boston in the early 1980s show a concern with interlocking transport, flow engineering and drainage infrastructure while creating picturesque landscapes and allowing for urban planning (Lindhölm, 2008; Mossop, 2006). Through close collaboration between landscape design, urban strategies and engineering, Olmsted proposed a complex project, combining ideas about nature and infrastructure as well as health, recreation and views. Frederick Olmsted Jr's proposals for other urban park networks, like Frederick Olmsted's work on urban projects such as Central Park in Manhattan, New York and Prospect Park in Brooklyn, had a significant influence on urbanism at the time, although their most ambitious urban proposals, notably those for the city of Los Angeles, are yet to be implemented (Matos, 2001).

Their influence can still be felt today. One example is the case of *landscape urbanism* where either Olmsted or his works are frequently used as a starting point. Charles Eliot also shared aspirations with Olmsted by designing parks as landscape infrastructures, notably the Boston public park system, and multifunctional multi-level urban settings, which also provided the infrastructure necessary for all aspects of city living, from transport and recreation to urban purposes and rehabilitations. Walter Griffin's 1911 design for Canberra is also an example of this, where the most significant spatial features played a key role in the location of the city's major axes and fundamental structures, providing another example of a very strong relationship between the shape of the city and the surrounding structure of the landscape. His projects for residential areas – which were heavily influenced by Olmsted's work - also demonstrate methods used for developing urban infrastructure that preserve and highlight features of the landscape, as can be seen in Castlecrag, Sydney (Matos, 2011).

Both Howard, in his book *Garden Cities of Tomorrow* (1902) and Geddes in his book *Cities in Evolution* (1915), which were both published more than half a century ago, found that the industrial revolution altered the delicate ecological and agrarian balance that could previously be found in cities. Later, McHarg would continue this argument in his book *Design with Nature* (1969). In the first half of the twentieth century, ecology and planning were, for the first time, explicitly linked in Geddes's work, with a basis on Benton MacKaye's regional planning and human ecology, Aldo Leopold's writings on the idea of an earth-based ethic, and a description of the city as a composition of human processes, which were intricately intertwined with Mumford's natural processes. The worldwide perception of *man Vs. nature*, which was strongly influenced by the ideas of transcendentalist Americans, led to a conceptualisation of nature as inherently good, and of cities and their development as inherently bad. After World War II, and following environmental criticisms of modernisation, this way of thinking resurfaced yet again, articulated for the first time in ecological and scientific terms and greatly influenced by Carson's 1962 *Silent Spring*, McHarg's 1969 *Design with Nature*, and Paul Duvigneaud's 1974 *La Synthèse Écologique*.

This work led to the development of regional environmental planning and, in particular, to McHarg's work at the University of Pennsylvania, where he was invited to design a course on landscape architecture and regional planning, which he began running in 1954.

Whereas green infrastructures and BCIs take ecological and environmental principles and concerns into consideration (Mell, 2017), green corridors and landscape urbanism use the landscape itself as a model for urban planning when they integrate cultural and aesthetic components into the design of a city. Landscape structures add production to ecological protection and recreation, moving closer to the concept of a multifunctional landscape advocated by Landscape Architecture. All of them underscore its multitude of benefits (Benedict and McMahon, 2006; Gill et al., 2007; Mell, 2008; Tzoulas et al., 2007; Nijhuis and Jauslin 2015), as well as highlighting the quantity and quality of regional, periurban, and urban open spaces, their multifunctional impact (Ghofrani, Sposito and Faggian, 2017); and the significance of connections between habitats (Van der Ryn and Cowan, 2013), production and communities. It has also been argued that the ecosystem services offered by them can secure healthy environments and health improvements, including physical and mental health to the people residing within or in close proximity to them (Tzoulas et al., 2007).

### 3. The Praça da Espanha Park

This project is based on sustainability and the concepts associated with it, but also to the area of transdisciplinarity and input from various sources of information in the search for a solution that will result in the creation of an Urban Park that can become important and gain significance to the people of Lisbon. However, the ability to see that this project is, above all, an unfinished proposal; or rather: an open project is even more important than a multitude of know-how. Therefore, the most important component for the success of this proposal is to bear in mind the idea that the final result of this project will also result from the participation of the community - which will be the contributing factor in defining a large part of what the Praça de Espanha Urban Park will be. More than just a project, this is a new proposal for a way in which a project can be planned and designed, and the way in which a city can be designed and built: seeking a way in which the community itself can define what their needs and desires are, so that the Praça de Espanha Park becomes a truly active element in building the identity(ies), image(s) and way of life in the city of Lisbon.

Urban Parks are not a new type of structure within the urban mesh of western cities: from Olmsted-designed Boston or New York parks to the *Bois de Paris*, the *Amsterdam Bos* or the *Tiergarten*, the atmospheres and uses of these spaces become a part of our lifestyle, or at the very least of our collective imagination. Even though Urban Parks may not be widespread in the countries of the southern Mediterranean Bay - possibly for climatic and geographical reasons, but more likely for political, social and cultural reasons - the fact is that we do have an idea of what a Park may be, or at least what a Park (in Lisbon) can give us: a place to read, lie on the grass, in the shade, a place to play or do sports, a place to spend time with your significant other, for a private hidden moment; a place of leisure to sit outside a café, take children to play, or – taking inspiration from the *Retiro* in Madrid – to see an exhibition or have an ice cream as you walk or cycle leisurely. A Park can also be a place to watch a concert (like Paul Simon and Art Garfunkel concerts held in Central Park), to protest in (like in *La Villette*, Paris), a place for culture (think the Serpentine Gallery in Kensington Gardens, or the Calouste Gulbenkian Foundation gardens right next door to the Praça de Espanha) or even science (the butterflies in the *Schmetterling Haus* in Vienna, next to the Museums Quartier).

Thus, although Portugal has remained largely untouched by the idea of a life lived in parks, it still has a place in our collective imagination: we are visibly optimistic about the role they could play in our lives and the way in which they can be used by us, both individually and as a collective. In fact, the design of the Praça de Espanha Urban Park program is almost entirely in line with our collective idea of a park: the temporary facilities and variable uses that can be found in Bryant Park in New York, the neighbourhood feel created by the Jardim da Estrela, the strong cultural and social component inspired by the Museums

Quartier, and the equipment and spaces that a contemporary park can (and should) bring to a city: sports and play areas, leisure areas and cultural spaces. However, although Urban Parks are expected to accommodate this vast array of activities, providing conditions that are comfortable enough and that foster enough of a community spirit to make them accessible to the population of a city and all those who visit it, the fact is that beyond these Functional Programs that usually form a part of such parks - such as sports fields, a Playground, outside seating areas and cafés, a Gallery, a Lake, or an Amphitheatre – many of the Urban Parks that have been built in Portugal most recently (see, for example, the Poets Park in Oeiras) provide these facilities, but it is sometimes unclear whether they contribute to the success of these spaces, or to improving the lives of the people who use them. Therefore, the propose put forward in this paper is simply to design a Park that is capable of acquiring a great number of unimaginable uses, providing spaces that the city may deem necessary, with enough flexibility to adapt to the changes or demands of the future. This proposal is therefore a two-part project.

### **3.1 Part I: An Unfinished Park**

The first part of this proposal refers to the basic structure of the park - the design of its bare bones. The focus of this part is to ensure that the park is designed as a functional unit that responds to the vast complexity of needs that may coexist there. These needs may vary from the flow of both pedestrian and transport systems (road, bus and underground networks) to the ecological network, through to the water systems and creating good living conditions for its users. This (first) part shall ensure that the park works in harmony with the environment, integrating it into and linking it to the green structure of the city of Lisbon, providing the Park's basic functions and the infrastructures necessary for it to operate as a green structure that, over the years, will create a unique environment within Lisbon's urban areas. Let us consider the example of a structure designed in the same way as K. Sejima and R. Nishizawa Kanazawa's 2005 Museum of Contemporary Art: a flexible space, within which its contents and functions may change over time. This space is designed as a single structure where fixed programs coexist with areas designed for extremely flexibility. In fact, the concept of the building itself proved to be even more important than the shape or image of the Museum, which led to it becoming a good example of what this proposal seeks to achieve: a simple structure, which is both fluid and flexible, as it is made up of numerous autonomous compartments. These compartments can be accessed from any point and can serve as the location for any kind of activity. Therefore, this proposal seeks to create a green skeleton that contains all the access routes and basic areas, infrastructures and primary pathways, overcoming any ecological constraints and establishing relationships with the city. This structure alone allows the park to have its own unique environment, which in turn allows it to serve the purpose required.

This structure coexists with a set of spaces (clearings) that have no defined program, use or function. How each of these clearings is furnished, the uses they may come to have and the environment that is created in each one of them will be decided by the population of Lisbon, either through a Participatory Program or through consultations with associations, institutions or even companies who would like to implement them in the park's clearings. Therefore, the first part of this project entails only the design of the Park's basic structure. The structure will include pedestrian and cycle routes to the city, internal routes, connections to public transport, internal pedestrian routes, a café and toilets, a kiosk and a bicycle park, outside seating areas and urban equipment as well as public lighting. This structure also ensures that vegetation is planted and that any environmental issues related to water and drainage control are overcome; a Main Clearing is also a part of the design (which is designed to be used occasionally for: concerts, sports activities, fairs and markets, parties, etc.) and a Retreat (which is designed to be used for leisure and recreational activities designed around a new water plan).

### **3.2 Part II: an Engaging Park, a Flexible Park**

The second part of the park is, in actual fact, less clear. Therefore, instead of defining the park's uses and functions (whether they are a playground, something that will definitely form a part of the park; or a skate park, which may not be necessary, what the proposal for the second part entails is to propose nothing, rather: the idea is that the population itself defines what is installed in the park). Thus, the remaining area

of the Park - that which is not accounted for by its main structure - is to be left empty. The idea is that it takes on different uses, but that the responsibility for defining these uses is given to the population of Lisbon itself. The shape and final contents of the Urban Park depend on the relationship created between the park's primary structure (the skeleton) and the functions that may be added to it. These functions will be located in several clearings, which will be dotted along the park's wooded area. These clearings will be of different sizes (ranging from 255 m<sup>2</sup> to 2300 m<sup>2</sup>), will all be accessible via the paths designed within the base structure and will be able to take on a wide range of functions: from being a simple square or gardens, to containing sports courts (for handball, basketball, tennis or paddle), other facilities (an art gallery, cafeteria or restaurant, changing rooms or toilets and an indoor pool), extreme sports parks, living areas, lawns or urban gardens.

However, an aspect that is even more important than defining the uses they will have, or what the clearings will contain (which shall be defined by the population), is that these clearings were designed to accommodate all types of facilities, which may be altered over time. An example of how one of the clearings can be used may take inspiration from Sonsbeek Pavilion (and its design), designed by Aldo Van Eyck in 1966 in order to host a private collection of sculptures in Arnhemna Urban Park in the Netherlands. This temporary pavilion could serve as inspiration for one of the many uses of any one of the twelve clearings in the proposal for the Praça de Espanha Urban Park, creating a structure that could host something new, creating a specific architectural environment, which would complement the rest of the contents of the Park. Similarly, different types of uses can be explored by examining the examples of the Temporary Pavilions built by the Serpentine Gallery in London's Kensington Gardens; urban vegetable patches run by the communities of Detroit, or even building a bandstand or sports court that can be used by any neighbourhood sports association. Thus, about half of the Park's available area is designed to be used in ways that are defined by the city itself: its residents, associations, public or private institutions interested in activities in the Park and, of course, the Lisbon City Council itself. Thus, an important part of the methodology proposed involves implementing a system of public consultations and a mechanism of participation, where the model – which must be drawn up by the City - must involve all the city's political, social and cultural agents who show interest in the Park, but also local or regional authorities (including associations, sports clubs and local organisations, as well as organisations operating in the wider sphere of the city of Lisbon) and, above all, its citizens. This formula will allow for the future of the park to truly reflect the functional needs of the city and the wishes of the population, which, over time, will involve replacing the functions that are shown to be inadequate and / or out-dated without a need to reorganise and / or remodel the Park. It should also be noted that several of these clearings (uses) could be leased to third parties (sports clubs, catering and cafeteria companies, art galleries, etc.). However, the central idea of this proposal centres on the following: the Praça de Espanha Urban Park will be whatever the city wants it to be.

#### **4. Proposal**

##### **4.1 General Outline**

The re-design of Praça de Espanha meets the ecological and sustainable development policies and strategies that the city of Lisbon has been working towards since the end of the 20<sup>th</sup> century. These strategies have been the basis for the implementation of a system of open spaces, green corridors and accessible mobility, which are integrated within the design of the city's ecological structure. These projects are what will gain Lisbon a place in the final of the European Green Capital Awards 2017. Lisbon is the most southerly Mediterranean city that has made it this far in the competition, which is a direct result of the way in which the city has gone back to nature, reflected in the way in which open, permeable and sustainable spaces have been emerging, consolidating Lisbon's ecological structure. Alongside the strategic value of this area within the City of Lisbon, especially in terms of the value it brings by providing mobility within the metropolis and bringing together diverse urban networks and the city's infrastructure, this proposal has been drawn up with a focus on the city's physical, ecological and cultural characteristics. In this sense, the function and current characteristics of the Praça de Espanha must be redefined, giving it a new importance and vocation within the ecological structure, defining it as

a park that is open to a wide spectrum of diversified uses that complement the needs of the surrounding urban spaces. With this pretext, the design for the Praça de Espanha Park considers the landscape as a model for urbanism, as has taken inspiration from the designs of the world's most famous parks, encompassing large-scale organisational, conceptual, cultural and ecological techniques. Its conceptual boundary is extended to the areas of urbanism and infrastructure, reflecting a link between landscape and urbanism, ecology and infrastructure. This proposal therefore works with multiple dimensions of the concept of landscape (which coincide with the pillars that make up the concept of sustainability and the creation of the identity of the city of Lisbon), more specifically the ecological and cultural dimensions that are in a state of continuous transformation. Within this conceptual framework, the ecological structural unit is more than a set of natural occurrences that are fundamental to the ecological balance of the landscape: it is a fundamental existential element that works as a driver of imagination, creation and construction. And yet, it is the social and cultural dimension of this new park that have proved to be the key elements in this proposal: the community as a participatory and determining element in the design of the space makes the way in which it is read and perceived meet the memory, needs and culture of the population. The Park is thus an expression of the way in which the population of the City of Lisbon can establish a relationship with a park that has been taken back to nature, which has been designed to be a space that its inhabitants can inhabit, cultivate, collect, enjoy and conserve in a way that is sustainable, both economically and ecologically, responding to the multifunctionality desired for such an urban area. This multifunctional understanding of space has determined that the understanding, characterisation, and inter-relational assessment of the various systems it is made up of is “pro-nature”, which is also a driving force behind the proposal being put forward as evidence of the place itself.

In this context, water becomes critically important and valuable due to its importance to both nature and infrastructure. It is therefore a guiding feature for this proposal, and must be considered in terms of improving the efficiency of water drainage systems in the park, as well as its use in nature conservation systems and systems of production and recreation that have previously been present in the park. Concerns about how this natural resource is managed, due to an awareness of the importance of the area's position in the flow of the Ribeira de Alcântara basin, provide solid grounds upon which this project may contribute towards making Lisbon a smart city in terms of water and energy production, which may then have characteristics that can be replicated locally, regionally, nationally and even internationally. Permeability (in both a conceptual sense and in a more literal sense of the word), as well as versatility are both inherently necessary in this project, for the way in which the different uses of the park are incorporated over time, in the different types of spaces defined in the proposal, given the functional and urban participation of the area in a larger urban system, as a structural space in the city of Lisbon, in which the program of uses to be adopted should be a key feature in supporting and redefining the area. On this basis, the whole design of the Park's basic structure has been conceived in terms of atmospheres and spatialities, which then define the shapes used. What is designed is space, which makes the most of the different panoramic and physical conditions present in the area: water-drainage; earth sculpting; context and a relationship with previously existing buildings, as well as those that are yet to be built, which will later serve to anchor the uses attributed to the park, as defined by the city.

#### **4.1 A Narrative of the Shapes / Design of the Project**

The Praça de Espanha Park encompasses multiple pathways – of air, water and roads – and is therefore one of the main axes of circulation and distribution of the city of Lisbon in terms of the structure of the road network. According to Lisbon's ecological structure, the park is located in a humid area, which, coupled with the fact that it runs alongside one of the city's most important roads, makes air drainage crucial (particularly to minimise the effects of pollution). That's the reason for the inclusion of wooded areas throughout the park, which also serve to promote and intensify the circulation of breezes. The proposal deepens and develops the principles of intervention contained within the urban ecological structure, defining a coherent design with a strong identity, which spatially translates a continuous, ecological and integrated structure, encouraging the flow of air, water and soil cycles. As a result, the park is designed to function within the coherence and unity of the Alcântara Valley ecological corridor, as laid out in the Lisbon Green Plan (based on the principles of continuity, permeability, flexibility and mobility), contributing to the system of open spaces upon which the city is now designed around.



The Park, thus, becomes a fundamental element within Lisbon's 'Humid System'. In fact, it will come to incorporate multiple systems: the hydraulic system, by increasing permeable areas and capturing rainwater, therefore contributing to reducing surface runoff and higher levels of water infiltration; a mobility system that runs smoothly, by promoting a network of pedestrian and cycling routes within the park, while also integrating the surrounding urban fabric, the structure of the city itself and the system of ecological continuity, contributing to creating Biotopes within the city. Alongside the undeniable ecological importance of the park, it will provide outdoor leisure areas, multifunctional spaces and a proximity to and connection with nature. Within the principles of sustainability mentioned above, water (drainage) will be the factor to determine the composition of the park, which has been designed in circles as determined by: the site's physical features - topography, drainage, orientation, gradient, soil and vegetation, but also its poetic features – light, depth, tactility and ambience. The design will therefore create: full and empty, light and shadow, open and closed, infiltration and flow, different materialities and functions. Clearings will be created in the woods (which will then be used as determined by the population), retention basins will be modelled, permanent areas will be made comfortable, spaces designed for recreational and sporting activities will be promoted, and areas will be set aside to allow for mobility and the park to be integrated into the surrounding urban fabric. These needs will result in ecologically functional areas that promote the cycles of water, air, soil and biological production; aesthetically functional areas that enable the park to be anchored to the surrounding urban fabric, the existence of a complementary network of pedestrian and cycle paths and the integration / assimilation of buildings.

These will all be areas that articulate, combine, transform and provide recreation, protection and production, thus translating / ensuring the multifunctionality and identity of the landscape. Allowing the water (drainage) system to be the protagonist and determining feature of the park's design leads to the lower elevation points (drainage line) being highlighted via the introduction of a formalised serpentine (structuring drainage line) that travels through the park, breaking up and standing out from the base system of circles. This waterway is made even more sensual / provocative by the system of vegetation created by the riparian woodland which is vertical, light, almost filigree, which is separate to and stands out from the remaining vegetation.

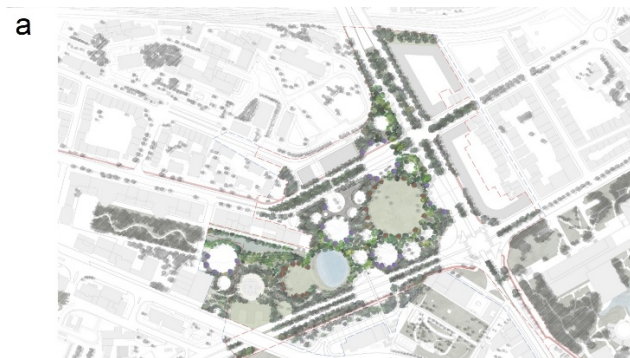


Figure 1 (a) Master Plan



Figure 2 (B) Aerial perspective view

## 5. General Description

### 5.1. Water | Drainage vs. Modelling

Due to its size and increasingly impermeable nature, fast-flowing streams have been created within the Ribeira de Alcântara drainage basin, which includes the Park, causing continual flooding problems. As such, and as has been previously stated, the water system must be managed as a matter of urgency by managing rainfall as close as possible to its source, reducing the volume of runoff and levels of pollutants by collecting, temporarily storing and subsequently discharging said rainwater, at a controlled rate, downstream; or by infiltrating permeable soils and directing excess flow to conventional sewage systems. This proposal includes a way in which the park can contribute to this system, by implementing



“sustainable urban drainage systems” (SUDS), using dry retention basins that, in addition to participating in managing rainwater and being compatible with the smooth mobility system, can also be a location within which events are hosted. In addition, increasing both the permeable areas and the amount of soil present contribute to significantly reducing the volume and speed of surface runoff, reducing the overload of conventional drainage systems, improving the clearance of sewage from these systems, and improving the quality of the water via filtration, adsorption and biological transformations. Therefore, drainage systems, combined with a more refined and subtle modelling of the terrain, are two key factors in the park’s design. Retention basins shape the land ecologically, but double up as areas that can be used for recreationally alongside the water. The serpentine structured drainage canal, combined with the vegetation system, has also been designed at a lower elevation and therefore acts as a surface retention basin - a flow of water that has flexible margins. Water permanently flows through the serpentine, but the level of the water may oscillate, depending on the general amounts of water available, providing a pleasant, mild area for hotter summer days as well as providing the clear benefits of sedimentation and the supply of nutrients to vegetation. Adjacent to this basin, to the west, will be an open leisure area, a shell that opens up to the North, providing easy access to the lake and views over the park. The circulation / mobility system has also been designed to follow ecological principles, as it has been moulded to and produced via porous pavements that either allow for water to be absorbed by the ground, or for to be caught and stored in subsurface layers and used subsequently and/ or fed back into the cycle.



Figure 3 Retention Basin

## 5.2. Clearings | community | Uses and Functions

As has already been mentioned, both the compositional and ecological principles adopted provide an articulated and sequential set of different spatialities that complement each other, and that have undeniable advantages in terms of urban ecology and mobility. However, it must also be noted that what is being created and provided is also a strong cultural identity. The identity of a space is intrinsically linked to its appropriation by the population. It can be considered to be appropriated when it increases the community’s sense of belonging to a place, enhances the sharing of experiences and daily life, and the different forms of both individual and collective expression. In this sense, and with the objective of enhancing social inclusion and community integration (one of the pillars of sustainability) this project has been conceived and designed to include open, “empty” clearings that are made available to meet the wants and needs of the population and communities, becoming a fundamental element of the process of space design and construction. These clearings can take on the role of hosting a huge variety of functions, from being spaces used for production: using horticulture to provide the affectionately-known “alfacinhas” (little lettuces) with the land they need to nurture their green fingers; to areas used to promote environmental sensitivity; a space for varied, suitable recreational activities for a variety of age groups, including sports, theatre, dance, traditional games, etc. The clearings can also be a location within which the population can experience the most diverse of atmospheres (calm and intimate, reflective, open, sunny and shady), and which can stimulate a huge variety of sensations (curiosity, smell, touch, peace and happiness), depending on the will and sensitivity of the population, which will mould the design of each space.

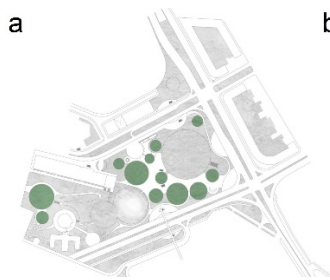


Figure 4 (a) Design of Clearings



Figure 5 (b) Main Clearing



Figure 3 (c) Lake clearing

### 5.3. Circulation and flows | Connections and anchorage to the urban fabric

The proposal includes a network of pathways that ensure the continuity, comfort and safety of transit, connecting the park to the surrounding urban fabric and, consequently, other parts of the city, in an attractive way that also encourages the population to use the park via this system, rather than using the roads. In accordance with the principles stated, soft mobility is promoted as a part of the project, prioritising and emphasising pedestrian and cycle paths, promoting natural and cultural values, valuing nature and the city's heritage, promoting social inclusion and linking the transport system (mobility) to the systems of vegetation and water (drainage). In this proposal, the transport system gives the space a clear flow.

The park's kinematic quality gives it dimension, providing a quick, direct routes to each of the spatialities and services offered, but also allowing users to wander, roam and explore the surrounding areas. The paths, which will often be drawn on the ground, will join onto the urban network perfectly, either working as an extension of them into the park, or being extended via them into the city, always as an equal but distinct entity that works in harmony with the landscape. The routes *grab* at the clearings and entrances of the park, inserting themselves into the organic nature of the spaces or becoming solid, formal pathways that anchor the park to the urban fabric. The pathways then branch out, winding around trees, through art installations of all kinds and alongside retention basins, providing different environments and experiences to all those who pass through and live their lives amongst the park's installations. The running track provides a more formal place on which to do sports, having been designed to work fluidly with the park's landscape, in permanent dialogue with the terrain, providing both activity and permanence in the southwesterly section of the park.

The (permeable) material used to build this system allows for rainwater to pass through it, thus working in conjunction with the drainage system and vegetation to comply with ecological principles and objectives.

### 5.4. Vegetation / Covering

The vegetation system is a fundamental component of the Ecological Structure in establishing physical continuity, but also in order to maintain the dynamism of the water cycle. This can be seen more specifically in terms of how it can promote the absorption of water into the subsoil, its return to the atmosphere as water vapour, its role in reducing radiation and solar reflection, producing oxygen and harvesting CO<sub>2</sub>. The vegetation system proposed for the Park is based mainly around native specimens, integrating herbaceous and shrub species that have a high capacity for absorbing heavy metals, for self-purification and the creation of habitats such as niches of biological revitalisation. It also contributes to enhancing the landscape, sustainability (ecological and economic) and enhancing biodiversity.

As reasonably big, busy roads surround the park, the proposal includes a considerable plantation of trees, which takes inspiration from the idea of a wood, with the objective of reducing the negative impact caused by the surrounding infrastructures. Together with the modelling of the terrain, this wood will visually and soundly protect the site while increasing the production of oxygen and biomass. The cover of trees proposed is a complex system consisting of tree cover, surface cover and shrub border that increases

soil fertility, permeability, aeration and aggregation of the land. Vegetation also plays a key role in maintaining the equilibrium of the water system through its ability to retain water, either by reducing the rate of runoff or by promoting water infiltration, preventing large volumes of it from flowing into critical points of the park within a short period of time.

The tree cover proposed consists mainly of wet species that bring the space together, thanks to their aesthetic nature as well as their ability to adapt to the lay of the land and urban conditions. Occasionally, in areas that have a higher elevation, transition dry species appear, differentiating these from the more humid areas. Exotic species are occasionally used to mark specific points of reference, at the entrances of the Park and in the areas used for recreational activities. Species that can already be found in the city have formed a large part of the proposal, which stand out for their colour, shape, texture, scale and light provided, as determined by the previously mentioned characteristics, introducing the immanent poetics of spaces, regardless of geographical or cultural distance. This design is closely linked to the introduction of shrubs, sub-shrubs and herbaceous species, which are naturally found alongside them. For areas with a lower elevation, which often have a higher moisture content, wet shrubs have been proposed. At higher elevations, which are often the driest, the proposal includes dry shrubs. The way in which they will be distributed throughout space, building massifs, defining clearings and alignments, will highlight the structure of the park and allow for more productive and sustainable urban ecosystems to be maintained. Beyond its functional and environmental importance, it is also decisive in aesthetic terms: edges limit the clearings, building them up; riparian vegetation draws a line that will be used for drainage and the shores of the lake; pre-existing trees will be maintained and remain within the plan, keeping the memory alive of previous lives the area has lived; contrasts between light and shadow and light and dark will be highlighted, constituting the spaces and atmospheres that have been designed to be buzzing with life.



Figure 6 (a) tree vegetation



Figure 7 (b) herbs and shrubs

## 6. Conclusion

The proposal for the Praça de Espanha park presented contributes to a more sustainable city, fits within the concept of smart cities and follows the principles of green infrastructures, BCIs, green corridors and landscape urbanism which, as has been examined, are not an entirely new concepts, but, instead, have been reinvented. As has been mentioned, the development of the city using the landscape is a practice that has been used since the early twentieth century in both Europe and the United States. In Europe, landscape architects have been developing their ideas and designs on various scales, from gardens and urban open spaces to urban gardens and urban water supply and drainage systems, and even modern gardens and naturalistic layout play areas, city expansion plans and green axes (Diedrich, 2009). We agree with Lisa Diedrich when she refers to a “landscape-oriented urbanism”, understanding the landscape as a driving force for urban planning.

In Portugal, a comprehensive vision of landscape and the ability to combine knowledge of the ecological systems that support it with an aesthetic vision of space ensures that an integrated and sensitive attitude is

the norm. The concepts that have been referred to have left a permanent mark on, and constitute the foundations of, the practices developed by Portuguese landscape architects who understand the landscape to be an ecological system (natural) and cultural system (construction) that is in continuous transformation. Within this conceptual framework, the ecological structural unit is more than a set of natural occurrences that are fundamental to the ecological balance of the landscape - it is a fundamental existential element that functions as a driver of imagination, creation and construction. The landscape is therefore an expression of existence and way of representing the relationship mankind has established with nature, transforming it into forms that respond to the various functionalities of the landscape, which we can then inhabit, cultivate, collect, enjoy and conserve, both in terms of sustainability and the economic and ecologic nature of processes. This understanding of landscape leads to the understanding, characterisation, and inter-relational assessment of the various systems that design the landscape being a methodological process, which also serve as motivation for the proposal to almost work as evidence of the pre-existing square. In Portugal, as in the rest of Europe, building a global city is the challenge we now face in the 21<sup>st</sup> century. As such, we would argue that cities can be understood and developed largely based on the landscape that surrounds and constitutes them. This proposal for the Praça de Espanha Park has been based on this philosophy.

Although this proposal has not fully defined what the Praça de Espanha Urban Park might become in the future - whether in terms of its uses and functions, or even in terms of its definitive environment - it has defined an ecologically sustainable basic structure, which serves to: mitigate the impacts of climate change; improve the management of water systems; contribute to the city's resilience by reducing the effects of global warming, moderating temperature and contributing to air circulation; establish itself as an important climate regulator; be flexible; generate environments that are both rich and diversified; link to the green system and urban structures of the city of Lisbon, as well as the equipment and buildings surrounding Praça de Espanha. These uses will then be combined with the participation and contribution of the population in creating contents and functions that are deemed necessary for the City, and which ensure social, sporting and recreational activities, improve physical and mental health, bring citizens closer to nature, its forms and processes, promote social collaboration by promoting group activities and strengthen ties, contributing to the economy by promoting the health of the citizens of the city and reducing drainage costs, contributing to making Lisbon a more attractive city, both aesthetically and socially, increasing the value of land and allowing for flexible and tailored intervention, the shape of which take whatever Lisbon needs the most.

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