Urban Parks and Sustainable City Planning–The Case of Portimão, Portugal

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Urban Parks and Sustainable City Planning - The Case of Portimão, Portugal

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Abstract: Urban growth creates challenges recognized by the global community. Sustainable development is a widely accepted strategic framework in city planning and urban parks play an important role in it. Nonetheless, it is argued, that urban parks and other open green spaces are important for the quality of life of an increasingly urbanized society. Following the industrial revolution with its massive urbanisation in the 19th century and the explosive growth of urban areas and nature degradation throughout the 20th century, the alienation between people and nature was increased. The urban park movement had objective to increase life quality in the modern city. Sustainability and city regeneration strategies focus mainly on man-made and built components of the urban environment, although, in the last years is noticed an increasing interest for development of nature in cities. In order to exemplify the importance of urban parks for sustainability and the future of the city this paper analyses some emblematic projects that marked the urban park movement in their construction period - the Central Park, the Park Amsterdamse Bos, the Park André-Citröen and the City Park of Porto. The role that urban green space play in ecological, social and economic sustainability will be discussed and the case study of the new City Park of Portimão will address the importance of urban green spaces for life quality and sustainable city development.

Keywords: Industrial revolution, Urban park movement, Sustainability, City planning.

1 Introduction - The urban park movement

Throughout the past century, the world's population had been rapidly congregating in urban areas. The urban population in the world was approximately 2.4 billion in 1995 number that is expected to duplicate at about the year 2025 [2]. Increasing population and urbanization is recognized as one of the most complex process at global scale. This massive urbanization begun in the industrial revolution in the nineteenth century and the decline of nature during the twentieth century increased public awareness to the necessity of introducing natural assets and components in urban contexts, what led to the creation and development of the urban park movement with the objective of increasing life quality in the modern city [32].

Urban parks are an important part of the complex urban ecosystem network and provide significant ecosystem services. It benefits urban communities environmentally, aesthetically, recreationally, psychologically and economically [7, 11, 20, 22]. The urban park movement [10, 32] had objective to increase the city life quality of the industrial revolution era (19th century) [31]. The planning of parks was closely related to urban and garden design [17].

The movement started in England [1, 16], creating public city parks like the Victoria Park which is considered the first urban park of history [31], while according to some authors the Birkenhead Park was the first urban park constructed exclusively with public money [37]. Public parks supported by municipal governments date from the 1840s in Britain and the 1850s in the United States and Canada. Initially urban parks were not public, once they were used only by a privileged part of the population [15, 23].

Following the industrial revolution with its massive urbanisation in the 19th century and the continued explosive growth of urban areas and the decline of nature throughout the 20th century, the alienation between people and the nature was increased. Urban parks, open space and related human health issues are a critical component of any state, regional and local infrastructure plan. Urban parks promote the core values at stake in building public infrastructure: providing children the simple joys of playing in the park; improving health and

recreation; equal access to public resources; democratic participation in deciding the future of the community; economic vitality for all with increased property values, local jobs, small business contracts, and affordable housing; spiritual values in protecting people and the earth; the environmental benefits of clean air, water, and ground; and sustainable regional planning.

The last years we have seen a tide of interest sweeping across Europe in the development of nature in cities, and an increasing amount of landscape development in urban areas has involved the use of 'naturalistic' styles. In the beginning of the urban park movement designers had as objective the representation of rural landscapes like in the central park in New York, but without any attempt to re-establish ecological functions [6, 13]. Later in Amsterdamse Bos park design evolutes in a mode to adapt ecological functions [37] and afterwards, urban park design adopted the formal design principles taking into consideration ecological criteria (Park André-Citröen). Presently the movement adopted the environmental education function like it is presented in the City Park of Porto. This principle is considered very important, once the development of proactive education and training policies not only on children but on any park user can play an essential role in the sustainability of the city by strengthening the importance of urban parks and other natural areas of the contemporaneous city.

The planning and management of urban parks is meaningful to urban sustainable development [38]. Urban Parks have significant ecological, social and economic functions, thus, the future social implications of new lifestyles, values, attitudes to nature and sustainability will lead to higher demands for urban parks [41]. Parks and other open spaces should not be considered a luxury in the city. Parks are democratic "commons" that bring diverse people together, fomenting a sense of community and social vitality that has been progressively lost in the last decades, by promoting human heath, environment and economic strength.

Social value is concerned with how places encourage people to interact in ways which lead to trust, mutual understanding, shared values and supportive behaviour. Social value arises when people can connect to others with common interests. Citizens access parks for recreation and to experience nature.

Green space offer significant ecosystem services, which are defined as "the benefits human population derives, directly or indirectly, from ecosystem functions" [13]. It can sequester carbon dioxide emissions and produce oxygen [24], purify air and water, regulate micro-climate, reduce noise [6], protect soil and water [25], maintain biodiversity [33], and have recreational, cultural and social values [44].

Additionally, public parks and green spaces can have a statistically significant effect on the sale price of houses in close proximity to those resources [5, 27]. According to Ganz and Boland [15], urban green space contributes to ecological sustainability. A functional network of green space is important for the maintenance of the ecological aspect of a sustainable urban landscape. Landscape connectivity should be promoted with the development of greenways and use of autochthonous species, adapted to local condition, with low maintenance cost, self-sufficient and sustainable [15].

To achieve these goals it is essential to follow all dimensions of sustainable development (environmental, social and economic) at the same time and with the same weight, following the principles presented in Florence in October 2000 in The European Landscape Convention, where the Council of Europe quoted that to achieve sustainability, development should be "based on a balanced and harmonious relationship between social needs, economic activity and the environment". Public open space that is well designed and well maintained can provide areas for appreciating nature, as well as for recreation and sport. The benefits include improvements in people's physical and mental health, and the environmental value of biodiversity and improved air quality.

In the present work it will be presented the case study of the Portimão City Park. The main objective of developing this park was to create a cultural landscape [3, 8, 9, 12, 39, 40] with potential to fulfil the economic, social, and environmental sustainability goals. Special attention was paid to energy efficiency and careful use of natural resources. Stakeholders were involved in the process from the beginning, once active public involvement and a healthier dialogue between political representatives, residents and economic actors is essential to find better solutions for sustainable city planning.

2 Methodology

The methodology was developed for the "Vale do Barranco do Rodrigo" area, located in the periphery of the Portimão city in south Portugal. Figure 1 shows the methodology diagram that is based in the holistic concept of landscape as a resource [21, 28, 34, 44].

In the first phase it was studied the origin of urban parks, analysed the evolution of urban park design – by analysing significant urban parks which marked the period when they were constructed – and described the expected future of the movement.

In the second phase was collected and analysed information about the different components of the landscape (geology, geomorphology, soil, relief, flora and cultural heritage). Then it was taken into consideration the existing territory constrains (urban plans and administrative servitudes).
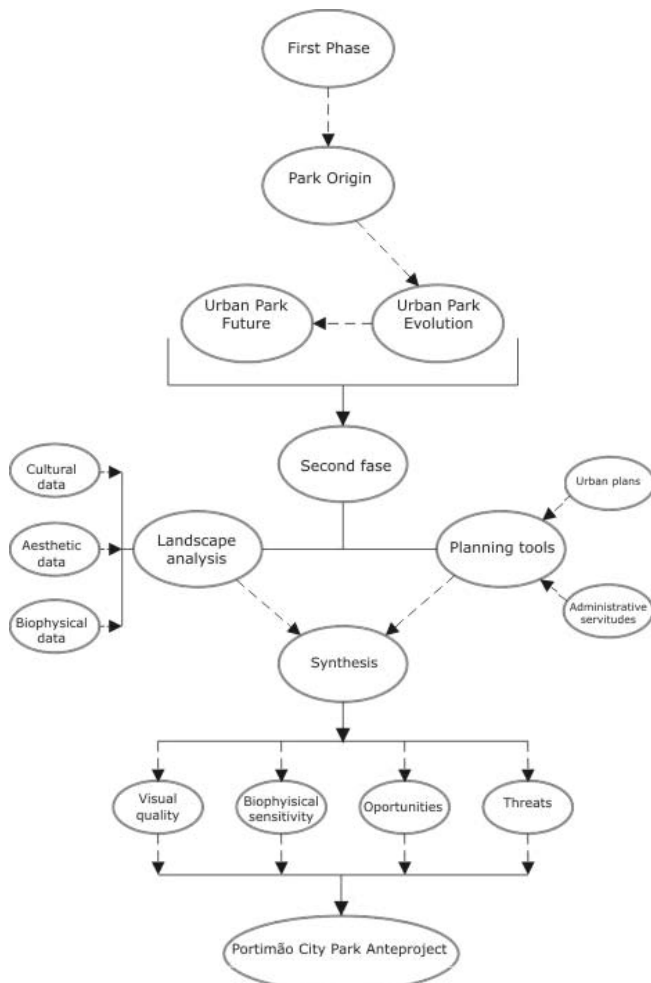

Figure 1- Methodology diagram

Afterwards, a synthesis of the above information provided the biophysical sensitivity, the visual quality and the opportunities and treats of the study area. The biophysical sensitivity was used to assess the vulnerability degree of the landscape towards impacts of natural or anthropogenic origin. Visual quality was used to evaluate the scenic value, cultural character and the landscape capacity to absorb change.

High quality landscapes usually present more sensitivity and low visual absorption capability [30]. From the above information was created the ante-

project of the Portimão Urban Park as an attractive and multifunctional space that promotes sustainable development.

3 Urban Parks analysed in the conception phase

Before analysing the case study of Portimão, it will be performed a short description of some urban parks that marked the urban park movement in their construction period and that influenced its conception - the Central Park, the Park Amsterdamse Bos, the Park André-Citröen and the City Park of Porto.

3.1 The Central Park.

The Central Park (figure 2) is located in New York City and has an area of approximately 341 hectares. It was designed by Frederick Olmsted and Calvert Vaux. The area of the Central Park corresponds to 6% of the Island of Manhattan. This area is composed by 136 hectares of forest, 200 hectares of lawns and meadows and 100 hectares of water.

The park contains roughly 26000 trees. With this structure Olmsted and Vaux intend to create a barrier to the exterior and to the buildings that eventually were proposed to the place. This vegetation was also used to develop new sceneries which intend to represent rural and natural sceneries and its organic forms. Those landscape forms coupled with a smart crop rotation played an important role in the dynamics of the Park. Open and closed spaces, provide to the visitors of the park a variety of places, turning the space into a varied and multifunctional space.
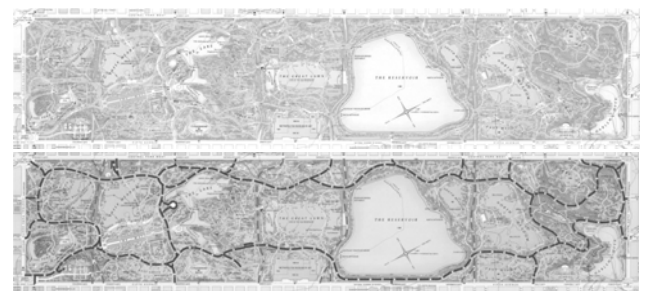

Figure 2- Central Park - green areas and circulation.

3.2 The Amsterdamse Bos park

The Amsterdamse Bos (figure 3) is located in Amsterdam in Holland. The park with an area of 935 hectares was designed the Department of Public Works of Amsterdam, led by the architect Cornelis Van Eesteren in association with the landscape architect Jacopa Mulder. However the design team

was multidisciplinary, constituted by teachers, botanists, biologists, engineers, architects, sociologists and town planners.
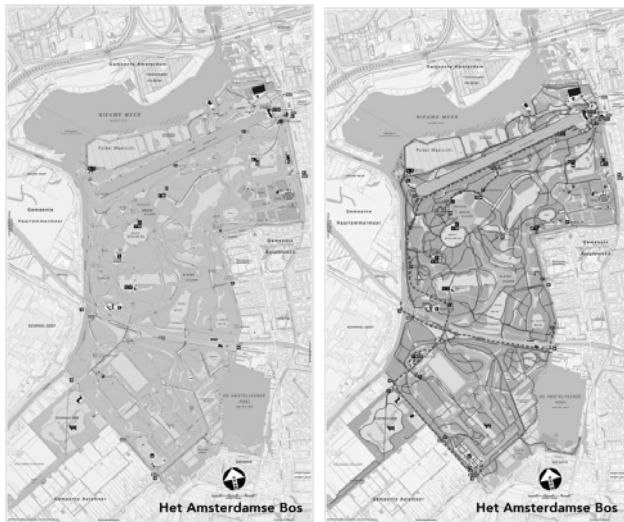

Figure 3- Amsterdamse Bos Park – green areas and circulation.

The park is composed by 420 hectares of forests; 215 hectares are of open spaces (meadows); 135 hectares of water; 70 hectares of wet zones; 65 hectares of roads, ways and parking lots and 30 hectares for other different uses.

The green structure of the Amsterdamse Bos is quite complex and was one of the major composition elements, reason why the plantation plan was very ambitious, not only in dimension, but also in schedule.

3.3 The Parc André – Citroën
The Parc André – Citroën (figure 4) is located in Paris, France, in the left margin of the River Seine. The park has an area of 14 hectares; the project was designed by the teams of the Landscape Architect Alan Provost and of the Landscape Architect Gilles Clément.
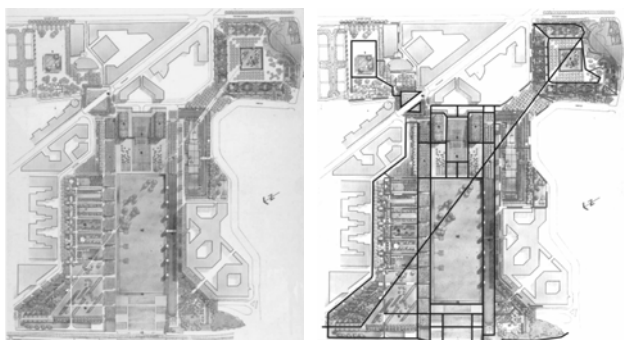

Figure 4- Park André - Citroën - green areas and circulation.

The Park contains 2500 trees, 70.000 shrubs, 250.000 lively plants, 25 fountains, 8 greenhouses and 1 hectare of water. The central element is a mowed rectangle, with 300*100 meters, limited by a channel of water and crossed in the diagonal by a long pass.

On the contrary of the Central Park, the created structure does not intend to represent the natural sceneries and its organic forms, but to create a connection with the River Seine.

3.4 The City Park of Porto
The Park of the city of Porto (figure 5) is the biggest green space of the city of Porto, Portugal. It occupies an area of approximately 100 hectares. The project was designed by the Landscape Architect Sidónio Pardal.

The design strategy of this park was based upon several design strategies used in the construction of representative parks built from the seventeenth century till the twentieth century. This park has several elements clearly inspired by the design of Le Nôtre, Kent, Repton, Paxton, Pückler, Olmsted, Alphand amog others. For this reason it is possible to say that park's design contains characteristics that were developed during the evolution of the Urban park Movement.
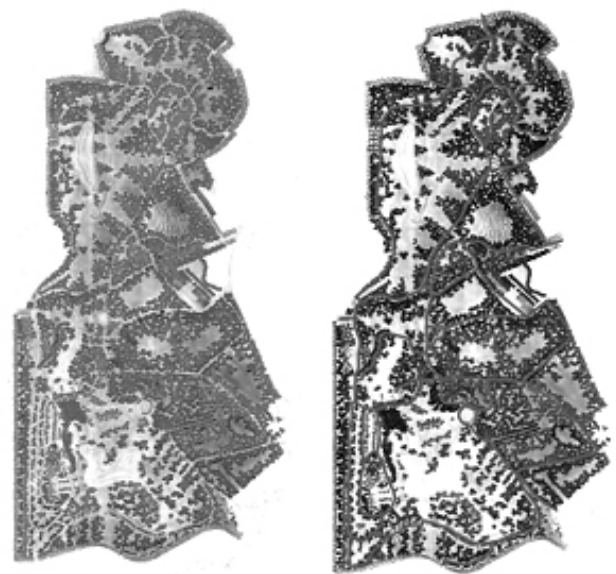

Figure 5- Park of the city of Porto - green areas and circulation.

Finishing the introduction of the urban parks analysed during the conception phase it is interesting to notice that the first urban parks models were the result of a public movement from citizens realising that they should do something about the high rates of disease, densities and growth. The main purpose

during the beginning of the urban park movement was a representation of rural landscapes and not the establishment of ecological functions. Even if ecological functions were established that was not the primordial objective, once the parks were usually located on the periphery of cities [14]. The Central Park case was to be located on the water front of the Lower East Side, but for political and economic reasons that plan was abandoned in favour of a location that was central to nothing except the geographic center of an island. This fact is indicative of the people beliefs. The park was not seen as an ecological entity, but as a recreational and leisure facility and its location in valuable lands was not worthy.

However, this reality changed and the construction of the Amsterdamse Bos Park started in 1934 with the development of the Bosbaan, shows that park design had evolve in a mode to adapt ecological functions. As Bijhouwer defended in 1937 [4], the selection of the appropriate species, the creation of appropriate slopes and the development of healthy environments were not only of visual importance, but were also required to enable open areas to have both ecological and recreational purposes. Thus, a park was conceived according to functional constraints having minded the need for natural areas with ecological and leisure and recreation purposes inside the city.

After this change in perception regarding the city green space functions and in order to minimize the problems emphasised during the industrial revolution, urban park design has adopted different styles taking ecological criteria into consideration. Presently several parks have introduced environmental education and social integration functions which are normally attached to the ecological one. Recycling resources and using renewable energy for park equipment is starting to be considered.

4 The new Park of Portimão case study

The park is located in "Vale do Barranco do Rodrigo" is located in Portimão, Algarve, which is characterized from a Mediterranean climate and beautiful landscapes. Algarve is the southern region of Portugal with a 22% of land occupied by forest and 38% by uncultivated maquis and gariques. In Algarve the main species are *Citrus sp.*, *Quercus suber, Quercus ilex, Seratonea siliqua*, and *Pinus pinaster*.

The population is characterized by a decreasing and scattered distribution in the mountainous areas and concentrated in costal zones. Tourism is the main activity and farmer population is continuously aging. Algarve boasts a rich and diversified natural heritage. Phoenicians, Greeks and Romans left in Algarve the most enduring signs of an important human presence predating the Arab conquests. The five centuries of Muslim presence left its legacy in the landscape, but the 1249 Christian conquest confirmed the identity of the region and founded the departure point for the discoveries of the new ways to India.

The Portimão city park represents an exceptional opportunity to establish a best practice example of sustainable urban development. The objective of the urban park project was to create an economically sustainable project that will take into consideration the environment and cultural heritage, and the spirit of the place (*genius loci*) [18, 29, 35, 42] and will be socially acceptable and valuable.

Thus, we respected the exigencies imposed from the local authorities, we created interest points that attract and serve the population; we use autochthonous plants and materials adapted to the surrounding landscape and we ask the people what they expect to see in that space.

Social value was measured by indicators using surveys before and after the project. Examples of indicators used in social survey were the following:

– the percentage of people who feel there is a good community spirit where they live.
– the percentage of people who are proud of their city,
– the decrease in the number of people suffering from mental health problems,
– the number of people taking regular exercise.

As a result the design and Project concept assent in the idea of "Urban Nature Symbiosis" (figure 6). From one side the park needs the city to exist and the city needs the ecological and social benefits arising from the park. The park was designed as a place of pedagogic and leisure activities and as an ecological space that the introduction of animal and vegetation species permit micro-climatic regularization and atmospheric purification.

The idea of symbiosis was based in the fact that the urban park movement was created as a solution for the industrial city environmental problems, which was represented as a tree (park) emerging from the city structure.

Taking into consideration the pretended development, the tree roots represent the cycling network which is the principal formation of the project, following the secondary configuration of trails and walkways represented from the branches.

Purpose of the above structures was also to give access and to connect the functional areas like the constructed elements and vegetation.

Figure 6- Representation of the present study concept of park and the modern city.

The development of this approach was based in the fact that if a design is not based in ideals and if designers do not have a clear idea of what problems they are solving and what goals they intent to achieve, program and form become extremely banal. It was based in this idea that the design team started to develop the master plan to the urban park of Portimão.

Although the analysis phase was developed mutually, in order to develop the Master plan we [design team], opted to apply a strategy relatively similar to the one presented by Bernard Tschumi for Parc de La Villette [43]. The strategy, denominated "superimposition" is one that enables the creation of a design in which the benefits of each one of the different systems are maximized, and where the changes introduced to design are based in the accomplishment of the proposed objectives.

In this sense, the master plan was based in three different systems, developed independently, which after designed were superimposed: (1) circulation; (2) green structure, and; (3) functional areas.

This idea applied to the Master plan was the first step in realising the long-term vision for the park. We had as objective to establish functional connections with the surrounding area in a way to facilitate access to the park by different means (foot, bicycle or car) and connect it in a coherent mode to the city. In this way the strategy allowed the creation of the best design possible to each one of the three

systems, once no one was narrowed by the development of the other. After the superimposition of the different systems the existing conflicts were analysed and discussed by the design team, in order to define which of the conflicting features was the more important to the overall design and to achieve the proposed objectives.

In terms of structure and form we opted to use naturalized lines in similarity with the Amsterdamse Bos Park of the modern period, once organic forms are proven to be more connected with the natural environment than rectilinear ones, and the objective was to integrate the proposed landscape in the existing one, reason why organic forms were the most appropriate ones.
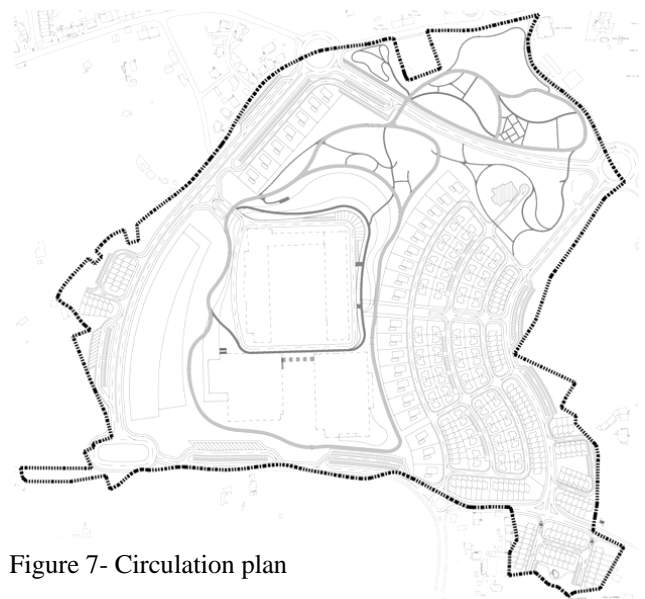

Figure 7- Circulation plan

The circulation plan constitutes the principal structure which systematizes the whole park and "creating its skeleton" (figure 7). This structure is composed by cycle and walk ways, which are organized according to a specific hierarchy evidenced in their width. Those ways have five meters width (enabling both the use by cyclists and walkers) and have several exercise stations associated to them along the park. The exclusively walkable structure is associated with the previous one, and allows its connection with the inner spaces of the park. It is important to mention regarding the design strategy that this network is also linked to the city network through neighbouring suburbs, expanding the limits of the park throughout the city.

Accessibility was analysed during the circulation plan development and is a very important issue because high quality public spaces should be utilized by each and everyone. Besides this, it is also acknowledged that on average, 20% of the total Portuguese population has a disability (Portuguese

Institute of Statistics 2003) which means that they have specific requirements to access events and facilities. This percentage is similar in many countries. A disability can affect a person's capacity to communicate, interact with others, learn or move about independently. In this way it is the designers' obligation to mitigate those limitations, promoting different kinds of access.

Purpose of the park was to assist people with mobility, vision, hearing or intellectual disabilities to make use of the environment. The purpose of the park access strategy was to provide an understanding of the range of disabilities that need to be addressed to allow people with disabilities to be appropriately assisted to operate independently, equitably and with dignity.

In functional terms the park presents a great diversity of spaces many of which equipped, generally termed as functional areas (figure 8). The superimposition strategy enabled that the location of these areas was only limited by the existing constrains and the proposed objectives and not by other design components. For this reason the different functional areas were strategically located to obtain a symbiosis between form and function.
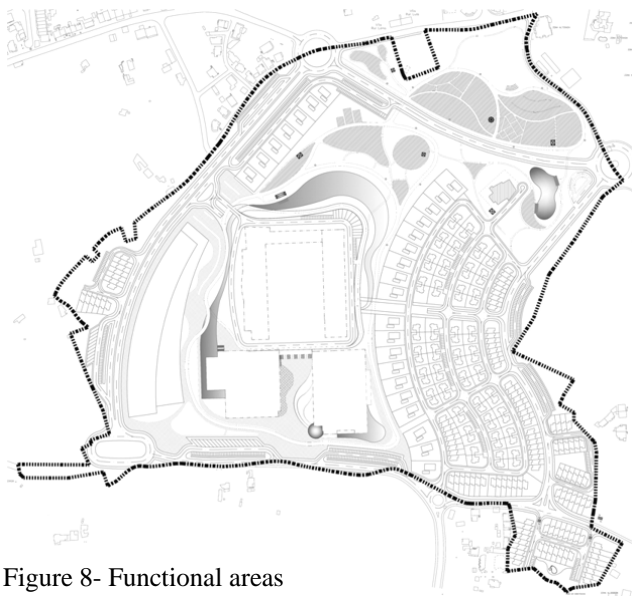

Figure 8- Functional areas

Furthermore with the objective to create a multifunctional space we introduced three distinct typologies for functional areas: leisure, education and ecology. Each one these were carefully located both according to the community needs and desires and to landscape features as it is the case of pleasant vistas.

Another objective was to preserve the natural environment enhance biodiversity and protect ecosystems that could serve as refugee for many species threatened from urban expansion and intensive agriculture activities. Thus, we opted to preserve large, bio-diverse and relatively untouched ecosystems and to use minimum number of infrastructures and constructed elements. In this mode only small structures associated with the park functions were introduced. The construction of an organic recycling unit for park leftovers that will be used at the park as bio-composts will result in reduced soil contamination from greenspace maintenance and favour sustainability.

The selected species and densities were also utilized in order to create different experiences inside the park, enhancing and celebrating the merge between ecology, leisure and recreation.
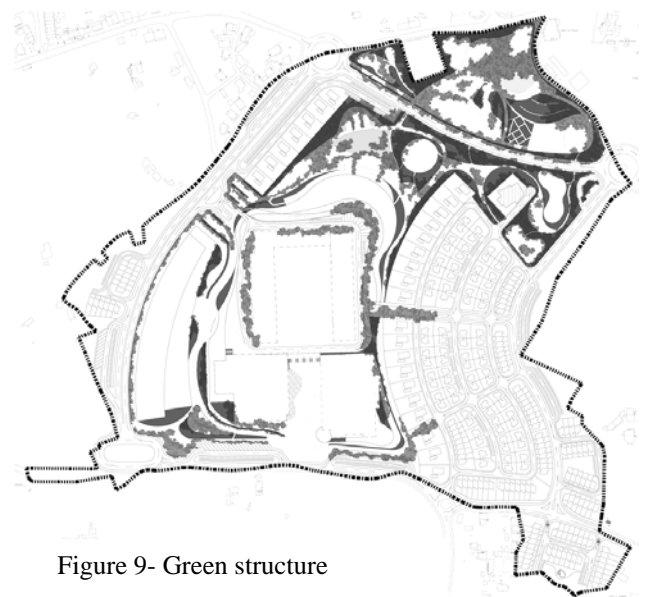

Figure 9- Green structure

For the green structure (figure 9) it was chosen a contrast between filled and unfilled space using small stands and disperse vegetation. Autochthonous species was chosen because they are well adapted to the region and provide a Mediterranean image to the space which permits better adjustment with the surrounding landscape.

Finally, the economic sustainability of the project focused on formation of a rise on surrounding property values (taking as an example the case of the Central Park where the land value rose so quickly that made land developers and real-state interests became the chief promoters of these type of spaces) and growth of businesses and jobs, contributing to the state and local economies. As it was expected, Parks create a high quality of life that attracts tax-paying businesses and residents to communities [26]. We looked to ensure that these economic benefits will be distributed equitably, through local jobs for local workers and affordable housing to avoid gentrification.

The vision, guiding the park's future development, is to transform the park into a vibrant, diverse and multi-functional community. The park environmental education area will be a concept for a leisure, living, working and learning community in which student life and learning processes are part of the structure of the community. As the strategy will be implemented the park will become progressively a centre for education and training, receiving students from all schools and universities of the region.
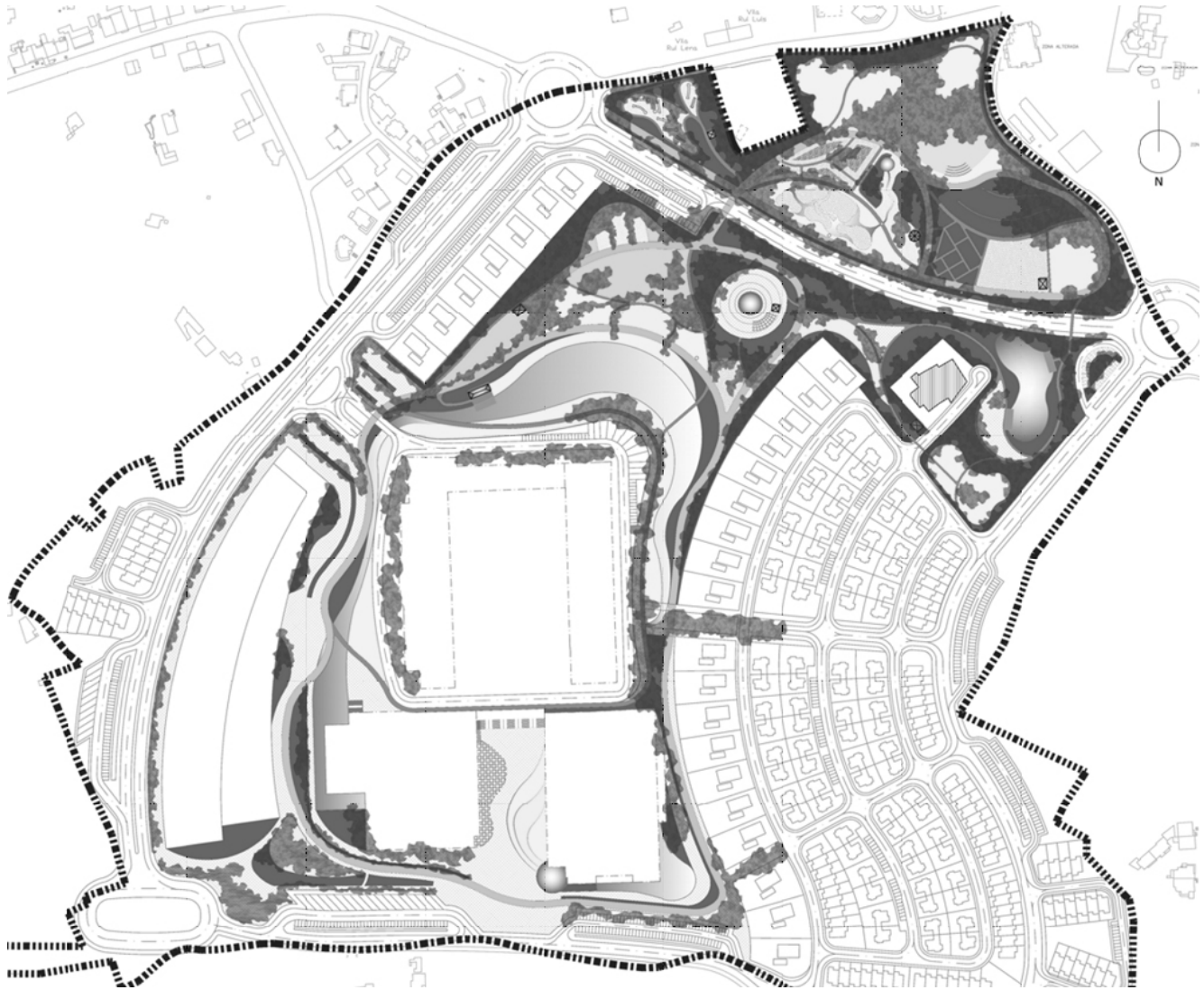

Figure 10- Master Plan of the Portimão City Park.

5 Conclusions

The role of urban parks as provider of social services and their importance for city sustainability has been addressed. The Master Plan of Portimão City Park encourages a broad range of recreational, leisure and public uses that utilise the available facilities and infrastructure and add to the unique qualities of the park for visitors, workers and residents. Cultural, educational and environmentally orientated uses are also envisaged.

In our approach to sustainability we strive to balance economic, environmental and social factors in a way that will ensure resource conservation and protection of the environment now and for future generations. Compared with other parks, the proposal for the park of Portimão is more conceptual and multifunctional, and it tries to struggle the fact that work is still the dominant fact of human life.

The Urban Park of Portimão is planned at the regional, city and neighbourhood levels, taking into account ecological principles but also the needs of people for green space and recreation. Park will

serve the diverse interests of different users in a balanced system that includes places for physical activity to improve health, active recreation, passive recreation, and wilderness areas. Rising property values on surrounding areas and the number of businesses and jobs grow contributing to the regional and local economies should be distributed equitably. Furthermore, environmental values like clean air, water, and ground, and habitat protection, should be promoted.

However, there are still some limitations in our study. The park plan is conceptual and not elaborated in detail. Species selection and management measures still need to be studied and designed. The use of renewable energy for park equipments should be considered.

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