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Historical Urban Parks in Egypt: A Suggested Criteria for Retrofitting

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Abstract

Historical urban parks are an essential part of public green spaces that significantly impact the quality of life in communities. This research highlights the increasing problem of urban heat islands (UHI) in major cities, which is linked to the loss of these historical parks and the damage to their landscapes. The study focuses on how historical parks influence the surrounding environment and improve outdoor thermal comfort (OTC) for visitors and residents. It reviews several environmental retrofitting strategies applied in different historical parks in Egypt to balance the microclimate. The research ultimately proposes a retrofitting criteria designed to mitigate the urban heat island effect and enhance outdoor thermal comfort in and around these parks. The aim is to investigate the factors affecting the retrofitting of historical parks. The research confirms the importance of historical parks as valuable resources for enhancing human health and providing social, educational, and economic benefits. The ultimate goal is to provide a framework for urban planners and heritage authorities to transform Egypt's historic gardens into active, thermally comfortable green spaces that are both culturally significant and climatically adaptive.

Keywords*:* Historical urban parks, Egypt, retrofitting strategies, microclimate improvement, outdoor thermal comfort, urban heat island mitigation

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1. Introduction

Over the past several decades, urban settings increased rapidly which is accompanied by the expansion of urban construction land. This has resulted in a major decrease in public green spaces and a continual increase in urban heat island effect. It is a regional temperature variation phenomenon that correlates with the urban growth of the city. The rise in temperatures has a serious impact on the health of urban dwellers particularly in large cities.

A historical urban park serves as a hub for outdoor recreational activities for locals and is a significant component of the urban green space system which helps to improve the outdoor thermal comfort (OTC) and reduce the impact of urban heat island (UHI).

Historical urban parks are also conductive to energy saving because large number of urban residents can stay in parks which in return reduces the use of air conditioning systems. Thus, outdoor thermal comfort is an important factor to attract urban residents to historical parks. Relevant studies have contributed a lot in urban parks, however the study for its outdoor thermal comfort has not been widely carried out.

The research main problem is that historical urban parks in the Egyptian context are abandoned, neglected, rapidly deteriorating and even disappearing in terms of area. Almost all of these parks are historical landscapes which emphasize the critical necessity to preserve and keep them in a good condition. The major issue with such historical parks is that they have received little attention, whether from the municipality or members of the community.

Moreover, in Egypt, there are no established criteria or processes for conserving such green open spaces. Therefore, it is necessary to pay attention to study and search the human needs through environmental design and planning.

There are some questions that should be developed in this study such as what are the benefits of historical parks in large cities to improve the quality of the surrounding environment and what are the main environmental retrofitting strategies that promote the outdoor thermal comfort (OTC) of historical urban parks.

In order to answer the research questions and understand the problems of its urban consequences that cause the current degradation of historical parks, the research is divided into three parts. The first part is a literature review that focuses on the significance of outdoor thermal comfort (OTC)and the different benefits of historical urban parks to ensure the quality of the urban environment through environmental, social and economic aspects. Also, it highlights the theoretical environmental retrofitting strategies of urban spaces. The second part is an analytical study that focus on historical urban parks in Cairo, Egypt that have been retrofitted offering insights into effective urban green space management. Then, the third part is a comparative study for the examples to conclude the retrofitting criteria of historical parks that leads to urban sustainability and community well-being.

2. Problem Statement: Degradation of Historical Urban Parks and Urban Heat Island

Half of the world's population lives in cities (United Nations, 2018) which demands a livable environment inside the city. Cities occupy about 2% of the earth's surface but their inhabitants consume 75% of the world's energy resources (Gago, Roldan, al., 2013).

Urban surroundings have grown remarkably during the past few decades. The extensive and uncontrolled urbanization degraded the environmental qualities and raised the energy usage of buildings. The design and operation of building environments have a significant impact on the quality of life within the urban areas (Fig. 1).

According to different studies, the average surface temperature in cities is expected to rise by 1.4 to 4.8C^{o} before the year 2100 (The Intergovernmental panel on Climate Change, 2021). Consequently, urban areas are subjected to the adverse effects of urbanization as elevated urban temperatures due to the increase of urban heat island phenomena, climate change, pollution, decrease of thermal comfort of urban dwellers in the outdoor settings. Under the background of global warming and the acceleration of cities' urbanization process, the climate of large cities has changed significantly (Gago, al., 2013).

One of the primary sources of urban heat island (UHI) is generated heat emissions. Additionally, energy consumption, intensive land use, pollution, high density in urban areas combined with buildings with heat trapped can increase this phenomena (Chistopher, al., 2015). Moreover, the most important causes of urban heat island (UHI) are recognized to be the absence of green spaces, the presence of materials with low permeability and the use of low-albedo paving materials on road surfaces and building exterior facades (Giannopoulou, al., 2011).

Urban heat island does not only affect the environment, but also the health of human well-being. Studies showed that high temperatures have been linked to increased heart rate and respiration, dizziness and fatigue (Xiong, Lian and Zhou, 2015). Particularly during summer, urban dwellers suffer from heat waves and increase in city temperatures because of urban heat island prevents night-time temperatures from decreasing (Ferdinando, al., 2017).

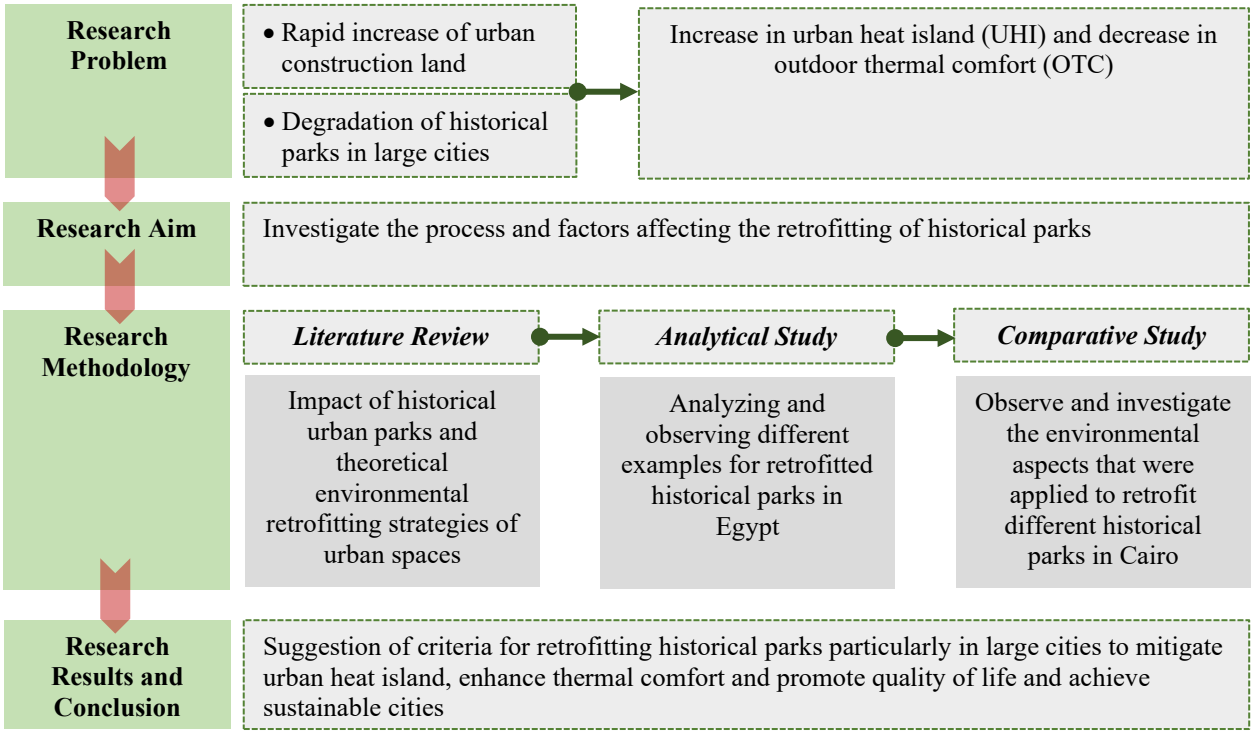

Figure 1. Structure of the study .

3. Historical Urban Parks and Outdoor Thermal Comfort

There are many definitions of which the historical urban parks are classified and defined. On one hand, according to ICOMOS-IFLA document on historic urban public parks, "*they are green spaces that are accessible for all people with different social levels*". A historic urban park is the one that is built during the 19th and 20th centuries and sometimes older. They have valuable landscape and hardscape elements such as old vegetation, water features, architectural elements which include monumental structures. They are used for social gatherings, leisure, events and activities. In general, the government is in charge of them and there are one or more public organizations that are responsible for the parks' maintenance. The continuous maintenance of these elements is significant to retrofit their original character and visual identity. Many of these historical parks have changes in their original layout, vegetation, character and purposes (ICOMOS-IFLA Document on Historic Urban Public Parks, 2017).

On the other hand, historic parks were described by the National Organization for Urban Harmony as: "*parks that were built during the mid-twentieth century*". They apply the rules and criteria for preservation, especially of non-infringement on any part of the park and the use of non-original purposes and they are an essential element of the urban history.

These parks are accessed by pedestrians via walkways, pavements, promenades or trials through and around the site. These park sites are established mainly to highlight and protect the cultural and historical concept for community education and entertainment (Nassar, 2010).

Parks that have valuable cultural and historical characteristics have to be preserved for its influence on the consciousness of individuals and remembrance of the past. These parks offer a social and cultural context in addition to scenarios or historical landscape growth in terms of infrastructure, order and land use. Understanding the conservation process of historical parks is challenging because of changing lifestyles, social changes in demands and public awareness of such values. However, the retrofitting process is complicated and difficult due to the lack of policies and laws and the inadequate legislation (Thani, al., 2015).

As green areas, historical urban parks are crucial in determining the sustainability of an urban area. Improving the social aspects of urban life is just as important as enhancing the biotic and abiotic components of urban life in order to create more sustainable cities. It is concerned with their experiences attitudes and the level of satisfaction with the standard of their daily surroundings (Chiesura, 2004). According to Brown, R. et. al (2015), historical urban parks in cities and green areas have the ability to generate thermally pleasant surroundings and lower heat stress sensitivity. However, in order to serve this purpose, parks should be designed in the light of the current climate as well as anticipated future climates (Brown, al., 2015). A lack of attention around climate-related priorities in urban planning studies will have an impact on outdoor thermal comfort (OTC) and health conditions of urban dwellers (Lai, al., 2019).

Outdoor thermal comfort is a crucial factor in enhancing the utilization of urban outdoor spaces because their benefaction is associated with the outdoor thermal conditions (Cheung and Jim, 2019). Therefore, managing the thermal state of urban historical parks is important to the success of landscape design and urban planning. Thermal comfort is defined as "the state of mind that expresses satisfaction with thermal environment and is evaluated by subjective evaluation". Comfort has been an essential component of effective outdoor urban space design and quality evaluation offering a helpful assessment of the outdoor built performance. Moreover, the culture and climate, the visiting purpose and the use of urban space also link to individuals' subjective evaluation of the outdoor comfort (Peng, al., 2019).

Compared to studies on thermal comfort in interior environments, outdoor thermal comfort is relatively a recent area of study. The concept of outdoor thermal comfort (OTC) contributes to the quality of life and vitality of open urban spaces by enhancing the physical and social settings of the open urban areas.

4. The Impact of Historical Urban Parks in Promoting Quality of Life

Numerous studies have addressed the subject of historic urban parks and shown that they significantly enhance people's quality of life (Shuib, al., 2015).

The idea of quality of life developed in the late 1960s and it was designed to evaluate the standard of living. First, it started with economic consideration and then developed the concept to include social factors to measure the satisfaction of the public. Some studies address it from an environmental perspective as one of the factors that contribute to the green open spaces of a city. Another study focus on a social perspective and its relationship to its nature, purpose and social application. Others consider it as a place to improve the economic significance of the urban community.

Historical urban parks are an important part of the complex urban ecosystem that play a strategic role for increasingly urbanized society. Natural resources and elements found in open green spaces in urban environments improve people's quality of life in a variety of ways that are important to the liveability of contemporary cities and the well-being of its residents (Chiesura, 2004).

Historical parks can preserve cultural heritage and provide tangible and intangible benefits for individuals, communities and societies. Additionally, they attract tourists boosting local economies and create jobs in tourism related industry (Abdel Kader and Shedid, 2017). Therefore, economy, environment, society, culture and tourism have become the primary factors that

influence the idea of quality of life. Thus, many studies have revealed the benefits of historical urban parks and its ability to influence these important factors and consequently the quality of life.

4.1 Environmental Benefits

The are many environmental benefits of historical parks as they can reduce urban heat island effect by allowing heat to flow out at night and cool the city after hot weather and improve the outdoor thermal environmental quality. Also, they promote residents' enjoyment and satisfaction as well as reduce stresses caused by activities (Razak, al., 2016). Furthermore, they can trap carbon dioxide emissions, reduce noise, protect soil and water.

It could be an area for enormous canopy trees to grow and give shade (Nady, 2016). They also contribute to biodiversity conservation by serving as sanctuaries for indigenous flora and fauna within urban landscapes, inspiring creativity and artistic expression, and serving as platforms for civic engagement and advocacy (Abdel Kader and Shedid, 2017).

4.2 Social Benefits

Historical parks can be used by a variety of individuals and can be a strategic tool for revitalization. Successful parks promote relaxation, social cohesion and get away from daily life while providing engaging elements such as vegetation and scenic views. In addition, parks are essential for recreation and experiencing nature. They provide opportunities for leisure active uses, such as picnics, meetings, general entertainment, community events, recreation and allow people to explore their surroundings.

Urban parks are areas where city dwellers from various socio-economic and cultural backgrounds, meet in their free time to connect with nature (Ter, 2011). Parks promote community involvement by providing residents a place to connect with and participate in their communities. Additionally, they offer a sense of place and important life-enhancing characteristics that promote both individual and community well-being. Decision makers may create constituencies that can support their urban park systems over time through understanding the community benefits of parks.

4.3 Economic Benefits

The function of historical urban parks can grant economic benefits for public authorities and residents. Maintaining a cleaner environment can lead to lower costs of pollution control and preservation actions. These sites stimulate the local economy by creating jobs in various sectors such as transportation, retail, tour guiding, conservation and administration. They generate revenue through entrance fees, guided tours, special events, … etc. which can be reinvested into preservation and maintenance of the park.

4.4 Tourism Benefits

Historical parks are significant tourist attractions where they attract visitors from around the world to explore their cultural and historical significance. They also promote cultural exchange by attracting visitors from diverse backgrounds, fostering mutual understanding and appreciation among people from different cultures. The influx of tourists to historical parks raises awareness about cultural heritage preservation, leading to increased resources for conservation projects (Nady, 2016).

In many communities, historical urban parks serve as the "engine" that encourages tourism. According to a simplified tourism model, tourists use some mode of transportation to leave their houses and travel to attractions. Many of these attractions are located in parks; while some parks are themselves attractions. This indicates parks are the main source of tourism in many areas.

4.5 Educational Benefits

Historical parks serve as outdoor classrooms where visitors can learn about history, architecture, art, and lifestyles of the past civilizations. Educational programs, interpretive exhibits and guided tours offer valuable insights into the significance of these sites, enriching the learning experiences of visitors of all ages (Nady, 2016). They have the ability to motivate young people to learn through the natural environment. The informal learning, non-formal programs and formal instructions associated with parks can support each other (Fig. 2).

Figure 2. The relation between historical urban parks and the quality of life .

5. Environmental Retrofitting Solutions for Historical Urban Parks

A historical retrofitted park is designed to respond to historical events or contexts in innovative ways. This type of park requires careful research and expertise to maintain authenticity effectively, interpret historical events, engage local communities and integrate sustainable design principles. They also require funding and resources to ensure long-term viability. Adaptability is crucial for future generations and regular evaluation and feedback are essential for identifying strengths and weaknesses. By addressing these challenges, historical urban parks can effectively engage visitors, preserve cultural heritage and foster a deeper understanding of history's relevance to contemporary society.

A historically retrofitted park is a space that honors the past while addressing contemporary needs and anticipating future challenges.

Sometimes parks include historical elements such as monuments, memorials and interactive displays using augmented reality and QR codes. Parks also feature educational spaces for students and residents. Contemporary features include recreational areas like playgrounds, sports facilities, walking and cycling trails, art installations, performance spaces and community spaces like picnic areas and community gardens.

Future-oriented design includes sustainability through green infrastructure, smart growth, renewable energy sources and native landscaping. The implementation plan involves community involvement through public meetings, volunteer programs and funding from government grants, private donations and corporate sponsorships. Partnerships with historical societies, educational institutions and local businesses are also encouraged.

In conclusion, a historically retrofitted park is not only a tribute to the past but also a vibrant, functional and sustainable community that asset for the present and the future.

The study focuses on the environmental aspects for retrofitting historical urban parks and maintaining the quality of life of the urban environment. These aspects comprise the elements of vegetation, water features, permeable surfaces and materials, shading structures and physical attributes to reduce urban heat island and promote outdoor thermal comfort (Ibrahim, al., 2017).

5.1 Vegetation (increasing the green cover)

One of the environmental retrofitting strategies frequently employed is the vegetation, which is a natural landscape element. It helps to achieve two aims, reducing urban heat island, improving microclimate and human thermal comfort in the outdoors.

The main impact of vegetation on the outdoor thermal comfort lies in its shading effect, where trees reduce thermal radiation through absorption and reflection. Trees can also block a great amount of incoming shortwave radiation and lower longwave radiation due to a drop in the surface temperature values (Lai, al., 2019).

There are several methods to employ vegetation to change the urban environment, especially through the use of large trees and lawns which not only provide visual permeability but also give recreational areas and more shade, preventing direct sunlight during summer months. Also, vegetation modifies the relative humidity, the wind, the reflected solar radiation from the ground and other surfaces and the solar radiation intensity.

According to reports, a large park provides a cooling impact on the surrounding urban environment that stretches for around 1.4 Km beyond the park's boundary. Thus, increasing the percentage of plant cover could considerably lower the temperature of air.

Another principle that affects microclimate is the humidification caused by evapotranspiration, which is the result of both evaporation and transpiration processes. According to earlier research, vegetation can increase the local relative humidity by 3% to 6% when compared to areas without vegetation (Louafi, al., 2017).

Furthermore, several studies have concentrated on the important effects achieved by vegetation in the adjustment of microclimate. According to a simulation in Spain's Mediterranean environment, trees can reduce the air temperature within their canopy by $1.5C^0$ in comparison to the surrounding region (Gkatspoulos, 2017).

5.2 Water Features

Water features are also considered a crucial element used in retrofitting historical parks. Their significance is due to their ability to improve sense of place within their location in the organization of spaces, as well as their ability to increase the quality of a place and consequently its psychological effect on users.

Researches focusing on the effect of water surfaces on microclimate are relatively less than those on vegetation. The use of artificial lakes, water fountains and water features in outdoor areas as bioclimatic techniques to improve the microclimate is an effective approach in hot dry conditions (Manteghi, al., 2015). Water bodies are effective heat drains, especially during the times of day when thermal stress is at its highest. The evaporation produced by the presence of water causes a lift in latent heat, which in turn leads to improved cooling throughout the day.

One may agree that these water bodies serve as efficient cooling systems for the surrounding communities. The area, depth and form of the water features are among their physical characteristics and how they affect microclimate. The expansion of the water features can enhance the evaporation area of the water surface and then increase the latent heat exchange between water and the atmospheric environment. According to a study in Singapore on sunny clear days, it was found that air temperatures near water features, like ponds, pools and water walls, … etc. were found cooler by up to $1.8C^o$ as compared to the surrounding urban built-up areas (Syafii, al., 2017). Moreover, a study in Japan, showed that air temperature above an urban water was $1\text{-}2C^o$ lower than that of the surrounding park during the daytime. However, there was an increase in the levels of humidity, as the evaporation process took place, with its cooling effect which could have a moderating effect in hot climates (Kimoto, al., 1998).

5.3 Permeable Materials for Ground Cover

Numerous retrofitting methods have been developed that employ highly reflecting pavement materials to improve microclimate. The use of cool pavement materials used for urban spaces are essential in maintaining a lower surface temperature and release less sensible heat in the surrounding air (Faragallah and Ragheb, 2022).

Pavements cover nearly 30-45% of the public gardens. They are a crucial urban element to take into account in order to mitigate urban heat island (UHI). The long-wave emission from the pavement during the night is blocked by the nearby structures, hence maintaining the heat absorbed

in the pavement. The insufficient heat drainage from the pavement surfaces also leads to warmer near-surface air temperatures (Manteghi and Moustafa, 2020).
Conventional paving materials can reach peak summertime temperatures of 48.67C0 transferring excessive heat to the air above them. Over the years, numerous studies have been carried out to create pavements that effectively reduce urban heat island effect. According to these, the ideal parameters of minimizing the phenomena include surface reflectivity which reduces the amount of heat absorbed by the pavements, the voids in porous pavements facilitate the evaporation of infiltrated water thus resulting in a cooling effect. Consequently, cool pavements have been designed in the recent decades to reflect more solar energy, enhance water evaporation.

5.4 Shading Structures

Shading structures like pergolas can significantly improve outdoor thermal comfort by reducing solar radiation and heat gain, leading to cooler temperatures and more comfortable spaces for people to occupy. Designing these structures with optimal dimensions and orientations, and considering the use of greenery, can further enhance their effectiveness. By creating cooler and more comfortable spaces, shading structures can increase the number of hours people can comfortably spend outdoors, especially in hot climates.

5.5 Green Infrastructure

The interconnected system of green areas that preserves the values and functions of the natural environment, promotes clear air and water and offers several advantages to both humans and wildlife. Green infrastructure the ecological framework required for environmental and economic sustainability (Benedict and Edward, 2002). Parks and open spaces serve as green infrastructure and are essential to the community. Cities may enhance flood management by planning and managing urban parks as parts of an interconnected green space system. In addition, providing a space for leisure and civic involvement, parks may maintain vital ecological processes and biological variety.

5.6 Smart Growth

Parks provide a variety of purposes in the urban settings, although most people think of them as places for “fun and games”. Urban parks, significantly define the layout, real estate value, traffic flow, public events and the civic culture of the communities. Cities gain beauty, breathing room and value when they have open areas. Public understanding of the critical role that parks play in improving the quality of life in large cities is growing, as well as understanding the links between the qualities of city parks and the sprawling growth on the fringe of cities. Historical parks are an important element of smart growth which takes into account both the public’s need for green spaces and the role of green spaces in reducing high building density. Smart growths of the public create opportunities for both governmental and organizations foundations to leverage support for smart growth, “by making and “re-making” urban parks that strengthen urban cores and protect the fringes.

6. Materials and Methods

6.1 An Overview of Historical Urban Parks in Egypt

There was a process of examining and identifying historical spaces, taking into account different indicators and resources to ensure that all parks are of this category in order to develop a coherent and comprehensive inventory of all urban green spaces classified as historically significant cultural landscapes in Egypt.
Some parks are well-known than others in the sense of being mentioned in various resources, by researchers or municipal/independent organizations. Others that are not lucky received less

attention and consequently less information and/or mention in the context of historical parks and gardens, in which some cases reflect the deterioration rate of a particular park or a garden.
The parks and gardens that are most known and studied in Egypt are generally the most used by citizens and/or those that relate to a well-known place or contemporary event. Historical parks carry layers of the city's heritage and culture such as The Azbakiya garden, El Orman, Al Fustat botanical garden, the Japanese garden, El Montazah and El Shalalat, … etc. and many more gardens and parks that are more than 200 years old in average (Abdel-Rahman, 2016).
The parks included in this study were selected from a variety of resources and evaluated according to the previous mentioned criteria for enhancing thermal comfort and promoting the quality of life. In order to capture key changes and major evolution challenges in the studied historical urban parks, several factors and important features have been taken into consideration. These mainly include the historic significance of the park and how its history as well as its physical design contribute to its importance and how these historic values have been passed or changed over the years. Another important aspect is also the identity of the park as a place inside the city, as well as an interactive space, which highlights the significance of the activities and their evolution through time. The physical deterioration of the activities, function and substantial design of the park is also crucial to analyse, whether this deterioration has taken place in terms of physical wear, or through the loss of parts of the park to the city's growing urban surrounding. This improves park management in terms of funding concentration and municipal management (Fathy and Mahfouz 2019).
Egypt's historical parks are currently suffering from a lack of funds, rules and restrictions as well as poor maintenance. The main challenges of Egypt's historical parks in typically the lack of open green spaces per person which is seldom more than 1.2m^2/person. Additionally, there is poor distribution and poor quality of parks that started to appear in the late 20th century till present as "prototypes designs" that neglect ecological concerns, social demands and interactive settings leaving many green spaces abandoned and uninhibited (Abdel-Rahman, 2016).
As a result, historical parks in Egypt are becoming less and losing its importance and people are visiting less frequently.

6.2 Applications of Retrofitting Historical Urban Parks in Egypt

6.2.1 Al Fustat Botanical Garden, Cairo

Al Fustat garden is the largest of its kind in the Middle east and it was built on 12 feddan (about 4000 m^2) in the heart of Historic Cairo to embrace the Civilization Museum, Ain Al Serra lake, the Religions Complex and Amr Ibn-Aas Mosque. The origins of the park are traced back to 937 when Muhammad Al-Ikhshidi transformed an arsenal established by Ahmed Bin Tulun into a Park. Today, the park is a landmark and an indicator to the rich history of Al-Fustat (Abdel Kader and Shedid 2017).
The park has suffered from neglect and degradation of all elements, which impacted its unique historical character. Thus, Cairo Governorate created a plan to retrofit the park in 2004. The management of the specialized gardens has supervised the work where it started in January 2005 and was finished in June 2006.
Al-Fustat Park retrofitting project was to restore the old Park to its previous beauty. The area has a great potential for tourism. There is an urgent need to address problems in place design, service demands, public amenities and environmental conservation measures. Egypt planned to restore Old Cairo's Al-Fustat Park in 2022 to become the largest open Park in the Middle East. The project aimed to transform the park into a historical touristic node with ancient architectural features with plenty of attractions, minimum population and maximum number of tourists and visitors to support traditional industries, revive the area's heritage and showcase its historical eras. The retrofitting

plan included a public park design with views of archaeological and historical sites aiming to revitalize historic Cairo.

The idea of the retrofitting project is to create a unique spot in the center of Cairo that is protected from the surrounding fast urbanization and stressful lifestyle leading to completely different microclimate and preserve the Islamic architecture in the area to make the old city of Fustat an open museum that attracts tourists from all around the world (Kesseiba, 2019).

The initiative aimed to restore the garden's original appearance through the restoration of the exterior fences, pergolas and statues, repairing infrastructure of electrical connections, drainage networks and irrigation systems (Specialized Parks Management, 2006). There are several rare trees in the park that are over 90 years old such as wicker trees and scarce short palms (Fig. 3).

The retrofitting project attempt to convert Al Fustat garden into an open botanical museum with the most important plants. According to the park redevelopment plan, all existing trees and plants were preserved.

Water is one of the primary design features of the park, where it occupies the largest area among the elements of the garden. There are four lakes, Lotus lake, Ship lake, Pedals lake and Students' lake. Water acts as the design element that creates the connection between the two sides of the garden as it extends under the level of the main street. Most of the water features are dry except the Pedal lake which is full of muddy water that contains dangerous bacteria. Several plans have been implemented to restore the lakes to their historical and aesthetic state.

The park includes a number of Japanese-style pergolas including the Arabic kiosk, Japanese cottage, Life kiosk and many small pergolas. The project attempted to restore the original status of them in order to provide shaded areas for sitting.

The park will become a regional and international tourist destination offering several cultural, commercial and traditional crafts as well as excavation and antiques areas.

Figure 3. Al Fustat park after renovation - Specialized Parks Management, 2006.

6.2.2 The Japanese Garden, Cairo

The Japanese garden in Helwan holds a historical significance as a unique example of early 20th century Egyptian landscaping and a symbol of cross-cultural exchange. It was designed and constructed in 1917 by the Egyptian architect Zulfaqar Pasha who dedicated the garden to Sultan Hussein, ruler of Egypt at that time. Zulfaqar Pasha designed the Japanese garden with a unique Asian style in Egypt. He has chosen this style because he was influenced by the Japanese, Chinese and Indian gardens where he spent a long time during his numerous travels. The Japanese Park is located in Helwan (Radwan, 2005).

The park is about 12 feddan (42,000 m^2) divided into two parks with a wide street. The right side of the entrance is situated on a hill whereas the left side is completely flat.

The right side is the most interesting part where there is a huge Buddha face carved out of a rock "Life Face". Also, there is a plateau encompassing a fountain with three little elephants. The fountain is dry. Right next to the fountain, there is a Japanese cottage "Life kiosk" where users can rest on benches.

The other side of the park also has lakes, which are dry. At the end of the park is another Japanese cottage with benches. To the right of that, there is an amusement park.
After the 1952 revolution, the gardens were neglected and Helwan became an industrial area. However, about a decade ago, with help from the Japanese Embassy, they were restored. Once again it became a desirable escape from the crowds of Cairo as it became green oasis amid concrete buildings.
Recent retrofitting efforts have been done at the gardens with some help from the Japanese Embassy which raised concerns about the preservation of this cherished public space. The gardens are now once again captivating visitors from around the world. Efforts were made to upgrade the infrastructure.
The park is divided into two parts and consists of various plant groups such as tall trees that line the paths, shrubs, climbers, palms, Japanese maples and cherry trees scattered throughout the garden and succulents. Lush landscape and greenery and meticulously pruned trees creates a picturesque landscape for visitors and contrasts with the city's solid built environment (Fig. 4).
The original architectural features such as the majestic fountains were carefully restored to their original condition.
All pergolas and kiosks have been precisely customized to meet the demands of the park visitors. The neoclassical pavilions were carefully developed. Shady spots can be found almost anywhere. Tables and benches with gazebos and pergolas provide perfect spaces for reading and chatting. The pond sand canals are all filled with water. Bridges over the canals are far larger and ornate, painted with finely carved wood.
Porous paving materials were employed to ensure impeccable restoration harmoniously merging old-world charm with modern functionalities.

Figure 4. Tall trees, water features and the porous paving cover the pathways, Radwan, 2005

6.2.3 Al Azbakiya Gardens, Cairo

Al Azbakiya Gardens is historically significant as one of the oldest gardens in the city, serving as a major green space in the Khedivial Cairo plan. It is one of Egypt's botanical Gardens, showcasing a distinguished European architectural design and featuring a collection of plants and trees from around the world spread over 20 feddan. However, time took its toll on the gardens, which fell into neglect and lost more than half of their space to urban encroachment. Today work is underway to retrofit the gardens in line with the renovation of Khedival Cairo and in recognition of their cultural and touristic significance.
The gardens are being rehabilitated by Sites International. The design and master plan for the renovation aims to revive the ancient garden as a breathing space for Cairo residents and to restore the garden's significance in the city's socio-urban and cultural landscape.
The project includes urban planning and design (the lake, the archaeological fountain, the Roman theatre, the pergola, the cafeteria). The development includes preserving valuable heritage trees and the hill area, infrastructure improvements, landscape architecture and garden design, along with the preservation, restoration and reconstruction of historical elements and structures.

The renovations will transform the gardens into a welcoming and accessible space for everyone, featuring a promenade along re-established lake, incorporating the remaining historical plants and trees, refurbished walkways and seating areas for pedestrians and reconstruction of pergolas.
New restaurants, cafeteria and other amenities capturing the spirit of the 19th century architectural design are being built to meet visitors' needs. With these renovations of Al Azbakiya Gardens can claim their historical significance and become once again a vibrant and cultural attraction (Fig.5).

Figure 5. The retrofitting of Al Azbakiya gardens, Radwan, 2005

Table 1. Analysis of the retrofitting plans applied in historical urban gardens in Cairo.

Points of Comparison		**Al Fustat Botanical Garden**	**The Japanese Garden**	**The Azbakiya Gardens**
Park's general information	Date	1937 (early 20th century)	1917 (early 20th century)	Mid 1960s (mid 20th century)
	Area	12 feddan	1 feddan	20 feddan
	Importance	Historical	Historical and cultural	Historical
Criteria to achieve quality of life	Environmental	✓	✓	✓
	Social	X	✓	✓
	Economic	X	X	✓
	Tourism	✓	✓	✓
	Educational	✓	X	✓
Environmental retrofitting strategies	Vegetation	✓	✓	✓
	Water Features	✓	✓	✓
	Permeable ground covers	X	✓	X
	Shading	✓	✓	✓
	Green Infrastructure	✓	✓	✓
	Smart growth	X	X	X

7. Findings and Discussion

After analyzing the retrofitting plans of the historical parks and gardens in Cairo, it is quite clear that the ratio of and percentage of historical parks in the city is relatively low. Nearly all the reviewed parks date back to the 19th and early 20th centuries which corresponds to the Egyptian Royal Era of Mohammed Ali Pacha's family, and the westernization cultural impact that

accompanied this period. It is easy to observe the current status and deterioration in the physical components of the parks can be viewed clearly.

The brief description of the addressed examples highlighted not only the significance of the scales and approaches to urban park retrofitting, but also the importance of these areas to the overall city's sustainability. In this scenario, it becomes evident that the park retrofitting constitutes and important approach in urban development. This shows that both the community and the municipality recognize the value of these parks and how they shape the city's urban identity.

Table 2. The relation between the impact of historical urban parks on the quality of life and the environmental retrofitting strategies.

Strategies	Vegetation and Water features	Paving materials	Shading elements	Smart Growth	Infrastructure
Environmental	Improves air quality, enhances biodiversity and regulates microclimate	Decrease urban heat island and enhance thermal comfort	Mitigates urban heat island and provide passive cooling	Preserves green urban areas and promoted land use efficiency	Supports sustainable water and energy systems and reduces water runoff
Social	Promotes well-being and social cohesion	Encourage sustainable urban design principles	Provides comfortable gathering spots	Encourages community participation and enhances walkability	Enhances public space accessibility, improves mobility and equity
Economic	Attracts eco-friendly investment	Promotes walking activities	Lowers energy demand for cooling in nearby buildings	Increase land value and encourages sustainable development	Reduces infrastructure maintenance costs and improves urban efficiency
Tourism	Adds atheistic value	Durable and affordable	Increase comfort for tourists	Aligns with sustainable tourism strategies	Supports visitor flow with resilient infrastructure.
Educational	Acts as a living lab for ecology and enhances environmental literacy	Enhance comfort for tourists	Teaching historic passive climate strategies	Promotes education on sustainable urbanism	Demonstrate green infrastructure technologies

8. Conclusion

Historical urban parks are crucial elements of the urban environment, serving as both urban core areas and open, mixed-use recreational spaces. Besides, it plays an essential functional role as part pf the landscape habitat.

Historical urban parks are valuable resources for enhancing human health in general through providing large green spaces where people may spend time in connecting with nature and by offering physical, social, educational, tourism-related activities. Although historical parks may be a valuable resource for a community, they are occasionally underutilized particularly in developing countries. In general, the restoration, conservation and revitalization of these historical parks are often expensive and makes pressure on the government which is primarily in charge of the historic public gardens. The governments of developing countries may suffer from providing the needed funds for the development programs. The proposed retrofitting strategies creates an excellent chance provides a great opportunity for reducing pressure on the governments for the retrofitting

and maintenance costs. It also gets citizens and stakeholders involved in the renovation and renovation project which may ensure that the park revitalization is successful as it will reflect the visitors needs and will be updated with the needs of future generations.

It is clear from the historical overview and presented framework that historical urban parks and gardens in Cairo are an integral element of the city's cultural heritage, and that these open areas hold layers of the city's history. These layers are facing current challenges of urban expansion from more urgent and profitable land uses. As well as this, the physical deterioration of the parks and gardens is closely related to the availability of funding and attention from both investors and municipalities. The state of these parks and gardens that face degradation depends on different factors, including increasing community engagement with the parks as well as their awareness of the significance of the spaces. Green retrofitting design strategies have demonstrated their ability to greatly affect outdoor thermal comfort, as they improve microclimate. A comprehensive review of the literature review shows their parameters which mainly include two groups: the effect of historical urban parks on the surrounding environment through different aspects such as the environmental, social, economic, tourism and educational benefits. The other group is the environmental retrofitting strategies which focus on the optimization of vegetation, water features, materials used for urban surface, infrastructure, smart growth and the extensive use of shading systems.

Retrofitting projects aimed to meet users' needs and expectations and prepare an environment that increases the attractiveness of the place and ensures creating a quality of life. Therefore, urban parks can be used despite rising temperatures, contributing to sustainability, and thus improving the city's quality of life. This clarifies the importance of integrating the effect of historical urban parks and green retrofitting strategies to provide a fully effective mitigation of urban heat island (UHI).

The research introduces a proposed model for pritorizing the retrofitting of historical gardens based on the historical and cultural values while unifying the purpose of conservation to ensure the comprehensiveness of retrofitting projects (Fig. 6).

To successfully retrofit historic gardens in Egypt, particularly in dense urban environments, development agencies and heritage authorities should operate within a framework that balances preservation with the practical needs of a modern city. The National Organization of Urban Harmony (NOUH) plays a critical role in this, its guidelines, combined with best international practices, should inform every project.

It is recommended to establish a comprehensive regulatory and management framework through implementing a unified management system that would be responsible for coordinating all planning, funding and implementation efforts, ensuring a cohesive vision for heritage preservation. Also, it is suggested to develop specific heritage guidelines for gardens that should address plant conservation, standards for the restoration of architectural elements (fountains, pergolas, statues, … etc.) specifying historically appropriate materials and techniques. Furthermore, it is suggested to embrace sustainable and community-centric retrofitting through adaptive reuse for long-term sustainability of historic gardens. New functions should be chosen based on the needs of the local community, ensuring the garden becomes a living, functional part of the urban. By adhering to these recommendations, Egyptian development agencies and heritage authorities can ensure that the retrofitting of historic gardens is not merely a restoration project but a strategic urban intervention that preserves a vital part of its cultural heritage, enhances the quality of life for its citizens and models sustainable community-driven for the future.

Therefore, sustainable parks will be a critical component in changing and promoting citizens' lives and cities if historical parks can shift from their current, primarily recreational use to a new role as a catalyst for community growth and development.

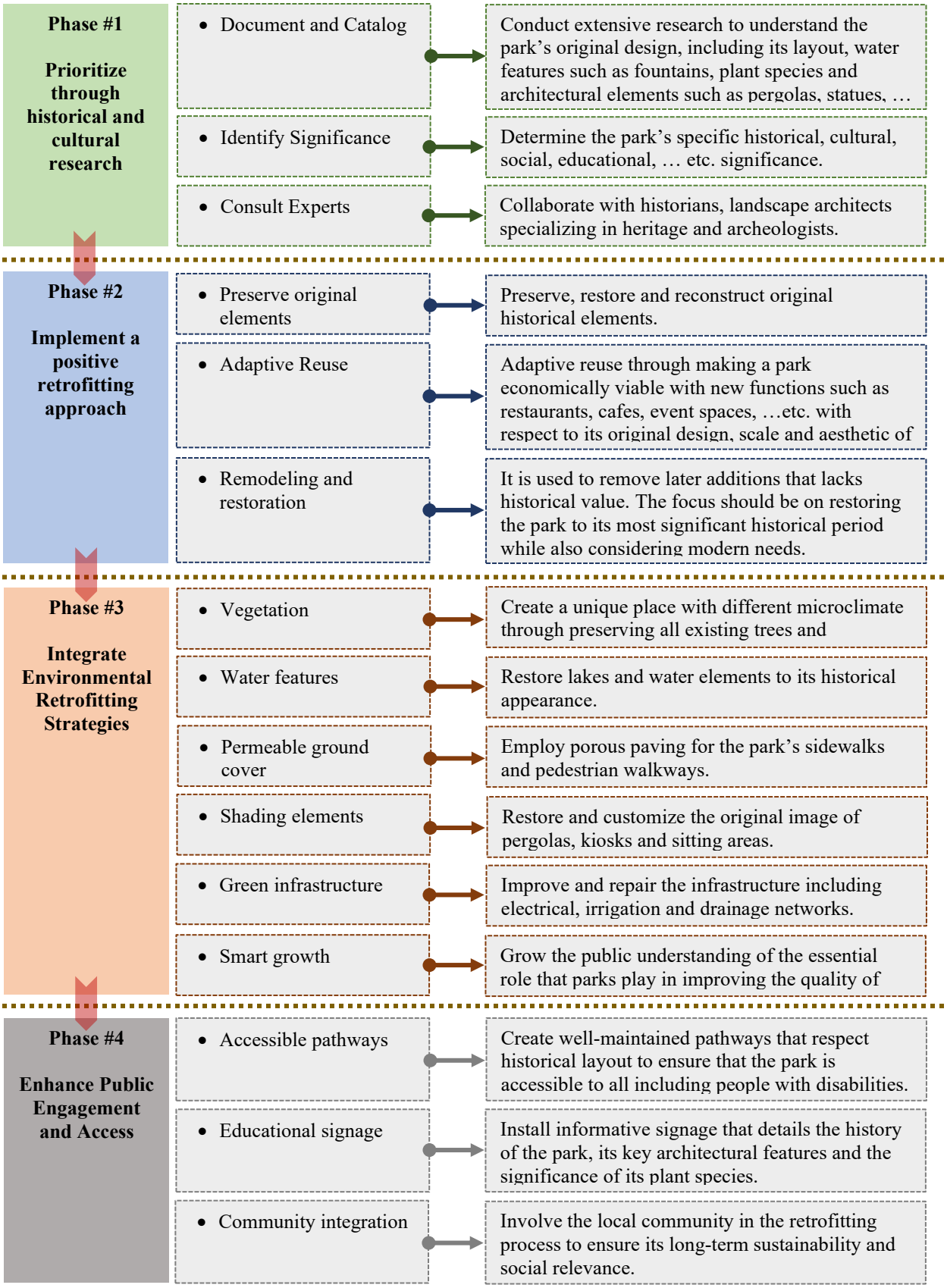

Figure 6. The proposed criteria for retrofitting historical urban parks.

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Conflicts of Interest
The authors declare no conflicts of interest were reported.

Data Availability
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