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Sustainable International Parks in Egypt: Suggested Criteria for Design

Lobna M. Moubarak [1] Aml Nour El Dine [2] Ezzat Abdel Moneim Morghany [3]

[1]Associated Professor, Architectural Department, Aswan University, Aswan, Egypt
[2]Architectural Department, Luxor High Institute of Engineering and Technology, Luxor, Egypt
[3]Professor, Architectural Department, Assiut University, Assiut, Egypt

ABSTRACT

Parks contributes to physical and mental well-being because they provide visitors with opportunities for recreation, education about nature, culture, and social interactions. Parks also reduce pollution and effects of climate change in big cities and increase the local property values and provide safe open spaces for social activities. Parks in developing countries face many challenges in terms of maintenance and availability of resources, especially international parks. To overcome these challenges, the concept of sustainability should be integrated in designing international parks to ensure the wise use of materials, energy, and water resources. This paper aims to suggest a group of criteria that can be used in designing and developing sustainable international parks. The proposed criteria have been classified into various categories related to energy, soil, water, materials, and cultural diversity. The analytical methodology aimed to investigate a number of sustainable landscape systems in order to deduce criteria for sustainable international parks. The weights of the proposed criteria have been determined by using the inductive methodology though conducting a questionnaire directed to specialists in urban design, proposing a set list of design criteria for sustainable parks landscape design in developing countries.

Keywords: International Parks, Urban Design, Sustainability

الحدائق الدولية المستدامة في مصر: معايير مقترحة للتصميم

الملخص

مما لا شك فيه أن الحدائق والمتنزهات يمكنها المساهمة في تحسين الصحة الجسدية والنفسية والذهنية للإنسان لأنها تقدم لزائريها فرصاً للترفيه والتعلم والتثقف وكذلك للتفاعلات الاجتماعية المختلفة. كما أن المتنزهات يمكنها أن تقلل معدلات التلوث في المدن الكبرى، بالإضافة إلى تقليل التأثيرات السلبية للتغير المناخي وزيادة القيمة العقارية للأراضي المحيطة بهذه المتنزهات، كما أنها تعتبر فراغات مفتوحة آمنة لممارسة الأنشطة الاجتماعية. تواجه المتنزهات في البلدان النامية العديد من التحديات مثل نقص الموارد وعدم الاهتمام بالصيانة الدورية، وخاصة الحدائق الدولية. للتغلب على هذه التحديات، يجب تضمين مفهوم الاستدامة في عملية تصميم الحدائق الدولية لضمان الاستخدام الرشيد للمواد الخام ومصادر الطاقة وموارد المياه.

تهدف هذه الورقة إلى اقتراح مجموعة من المعايير التي يمكن استخدامها عند تصميم وتطوير المنتزهات الدولية المستدامة. تم تصنيف المعايير المقترحة إلى فئات مختلفة تتعلق بالطاقة والتربة والمياه والمواد والتنوع الثقافي. تم استخدام المنهجية التحليلية للتحقيق في عدد من أنظمة المناظر الطبيعية المستدامة من أجل استنتاج معايير للمنتزهات الدولية المستدامة. تم تحديد أوزان المعايير المقترحة باستخدام المنهج الاستقرائي من خلال إجراء استبيان موجه إلى المتخصصين في التصميم الحضري واقتراح قائمة محددة من معايير التصميم لتصميم المنتزهات المستدامة في البلدان النامية.

الكلمات المفتاحية: المتنزهات الدولية، التصميم الحضري، الاستدامة

INTRODUCTION

About 68% of the world population expected to live in urban areas by 2050 (UN, 2018). Achievement of sustainability in urban areas can occur through the limitation of urban sprawl, expansion of green spaces and recreational areas, which can reduce energy consumption, harmful emissions, and noise levels, and add aesthetics to the hypercomplex cities (Broere, 2012). Parks can provide perfect outdoor spaces for social contact if they are well integrated with their surroundings. Natural places such as urban parks, forests, greenbelts, and natural features such as trees and water elements can contribute to improving the quality of life within a complex urban context (Chiesura, 2004). Despite the diversity of recreational services in the city, international parks can be considered as the most important and the best model of parks because it is anew social spaces through which intercultural concepts of coexistence are developed and are now an open field for experimenting with social and ecological sustainability strategies (Müller, 2002). Sports fields, theaters, children's areas, swimming pools, industrial and natural lakes are considered the main components of international parks. This type of parks can also include animals from different countries, and it is distinguished by the existence of cultural and recreational buildings and other artifacts such as monuments, fountains or structures that reflect different cultures from different countries, it shows new forms of communication through the diversity of languages and methods of life, arts and life experiences (Shimeles, 2000).

Sustainable spaces are places where people live and want to stay, with a real sense of place. These successful places should contain well-designed green spaces with functional landscape that people will need to use and enjoy. Many organizations have contributed to the development of a set of criteria that show how green spaces can provide sustainable economic, social, cultural, and environmental benefits. There are strong links between designing high-quality green spaces and creating a healthy environment, which addresses issues such as anti-social behavior .Parks and landscaping provide a range of quantifiable ecosystem services, including carbon storage, shading, evaporative cooling, and improved air quality and storm water management. For these reasons, "greening the city landscape" should be a central objective in any development agenda (Adams et al., 2011). Regeneration strategies have mainly focused on the man-made and built components of the urban environment, and attention to the natural components and green spaces of the urban structure remains weak (Tyrväinen & Väänänen, 1998).

Climate change and lack of natural resources make it extremely necessary to create sustainable international parks that should be compatible with the local environmental and social context and can adapt to the local climate. Additionally, the urban design of these parks must be cost-effective, visually attractive, and environmentally friendly. Public participation, citizen participation, and a qualitative assessment of their needs and interests also help urban communities to express shared values in general, which in turn can serve as criteria for local planners to envision more sustainable strategies for parks (Chiesura 2004).

1. RESEARCH PROBLEM

As overcrowding, complexity and pollution increase in most urban entities, the need for sustainable green and recreational areas is growing. In Egypt, there is a great demand for international parks as outdoor community centers that provide opportunities

for recreational activities and social interactions, promotes air quality, encourage tourism, advertise different cultures and improve the quality of life.

In 2010, Parks and Leisure Australia and the Western Australian Department of Sport and Recreation commissioned research that revealed growing concerns about a lack of clear and consistent terminology and descriptions that allowed for comparable classification and shared understandings of public open space. While many of the same terminology were regularly used, there was some misunderstanding about how they were defined and perceived by professionals from other fields (Rutherford et al, 2013). The sequences of this problem appeared in Egypt clearly, as there are approximately (10) parks in Egypt that are supposed to be international parks, as shown in Table (1), although this type of classification of parks in Egypt has been ignored, which classifies parks into; National parks, Regional parks, City parks, District parks, Neighborhood parks, Cluster parks, street gardens (The National Organization for "Urban Harmony", 2010).

As a result of this neglect, this type of park appears degraded, unused, closed, unattractive and unsustainable. The differences between these parks are remarkable in terms of area, style, components, and elements that indicate that there are no distinct considerations or criteria for designing such parks in Egypt, as shown in Table (1) & Figure (6). The problem is extending in Egypt because some parks have been replaced with investment and tourism projects such as International Park in Alexandria. This Park, which covers more than 130 acres of green areas has transformed into an area full of chaos and lacks visual order. The government decided to change the land uses and remove all green elements to build commercial towers instead of developing the largest park in the city and improve its appearance and benefit from it as a large open public area (Awaida & Fathi, 2018)

The aim of developing open green areas is one of the wider aims of Egyptian vision of sustainable development 2030 in terms of achieving society ambitions through improving the quality of life, providing people with effective services, raising the efficiency of the infrastructure of cultural services, and achieving more balanced spatial management (Ministry of Planning, Monitoring & Administrative Reform., 2016). However, the concept of sustainability has not been incorporated into the process of designing or developing international parks.

According to the study, it is clear the extent to which this type of parks lacks criteria for the design of this type of parks, so the research tries to find a solution to this problem by proposing criteria for designing sustainable international parks in Egypt that help urban planners and designers to design and develop this type of parks and distinguish them with their different characteristics.

Table (1): Classification of Egypt International Parks

Parks	Establishment Date	Current Condition	Area	Data Source
Cairo International Park, Nasr City	1987	Open	50 acres	(Elbosla, 2021)
Alexandria International Park	1990	Open	125 acres	(Awaida & Fathi, 2018)

Parks	Establishment Date	Current Condition	Area	Data Source
Sheik Zayed International Park	2020	Open	65 acres	(Al Shami, 2019)
Aswan International Park	1990	Closed	105 acres	(Tawfiq, 2019)
Esna International Park – Luxor	1995	Open	140 acres	(Marei, 2016)
International Park in Bany Ghaleb – Assiut	2000	Closed	25 acres	(Omar, 2017)

Table (1): Classification of Egypt International Parks (cont.)

Parks	Establishment Date	Current Condition	Area	Data Source
International Park in Port Said	2018	Open	8 acres	(Gomaa, 2020)
International Friendship Park in Sharm El Sheik	2018	Open	9.5 acres	(Refaee, 2018)
The International Park in Abu Filo, El Menia	not available	Open	13 acres	(Al-Basel, 2017)
International Salam Park in Sharm	2010	Open	33 acres	(Mustafa, 2012)

Source: mentioned in Data Source column to every park

Alexandria International Park
source: El-Sheikh, 2016

Cairo International Park
source: Saeed, 2021

Port SaidI Park
source: Falah, 2020

Esna International Park
source: Marei, 2016

Figure (1): Example of international parks in Egypt

2. LITERATURE REVIEW

Parks and open spaces within a city improve our physical and mental health, strengthen our communities and make our cities and neighborhoods more attractive places to live and work (Sherer, 2006). Muller defined the international parks as the combination of economic, ecological, social and cultural elements, the diversity of farming methods, subsistence skills, with the emergence of new forms of intercultural communication that arise through joint action, and the public (Müller, 2001). It is well known that urban design can be considered as a multi-faceted concept influenced by social, economic, environmental, technical, political and ethical factors, and urban design can also be understood as a process that refers to a method, procedure, or series of actions or events that lead to the achievement of some results (Berta et al., 2018). For a garden to be sustainable, six important criteria must be met; Expressing purpose, setting goals and objectives, planning development and public participation, managing assets, fair access and safety. This paper presented sustainability metrics, features, and priorities for different types of parks as global standards for park planning (Sarhan et al, 2016). Sustainability indicators for urban development should include more standards around public spaces and open green spaces, as well as indicators that reflect citizens' satisfaction and perceptions of their environments. Urban planners and urban designers must also consider the design of green spaces with a variety of activities to meet the needs and aspirations of all types of users; Children, families and the elderly (Chiesura, 2004). Maintaining social relationships and meanings reinforces and maintains cultural systems. To truly understand social sustainability, it is important to extend Throsby's analysis by adding three important dimensions; Place preservation, cultural ecology theories, cultural diversity (Soenen, 2006).

In the field of gardens and recreation, a commitment to sustainable management practices provides an opportunity to address many of the most pressing challenges, such as ensuring gardens are designed with long-term maintenance requirements, promoting community health and well-being, and reducing resource consumption. It is also useful to set standards to achieve sustainability goals and add new strategies for sustainable design (Gallagher, 2012). As we see now in Egypt, the visual value of Alexandria's cultural parks has declined over time, and the problem of the deterioration of these parks is due to the lack of proper maintenance and care (Abdel Rahman, 2016). Several solutions have been proposed to address these problems, such as integrating murals with architectural styles to preserve identity and express the history and civilization of the ancient city of Alexandria (Elgendy, 2017).

The design of a sustainable garden must take into account the use of native plants, the maintenance of streams or other natural systems, wildlife habitats, the integration of appropriate technologies or infrastructure, recycling to preserve the environmental value of the gardens, as well as social values because sustainability is a social concept rather than a technical one or biologically (Cranz et al, 2004).New York parks have also reduced vehicles and related facilities and their carbon emissions by 12% since 2007. Emissions from facility heating have decreased by 57% since 2007 (Adams et al., 2011).

With the beginning of the 21st century, some Organizations appeared that support the sustainability of open areas and parks with clear goals, such as New York City Department of Parks and Recreation (NYC) which has new plans for how to design, build and maintain parks (Adams et al., 2011), SITES v2 Rating System as a rating system for sustainable land design and development, which is a classification system

that identifies sustainable sites and measures their performance and thus increases the value of landscapes (Sustainable Sites Initiative, 2014), and The Oregon Parks and Recreation Department (OPRD), that promotes the use of sustainable practices (Gallagher, 2012). The three systems varied in terms of the geographical areas in which they appeared. NYC appeared in New York City, System SITES (V.2) appeared in the United States of America, and OPRD appeared in Oregon.

The Sustainable Sites Initiative was predicated on the belief that landscape is an important part of the built environment that can be designed and managed to prevent, alleviate, and even reverse the negative consequences of development and climate change. Unlike buildings, which lose value over time, sustainable landscapes retain their worth by continuing to deliver various benefits such as stormwater management, resource conservation, pollution reduction, and better human health and well-being (Steiner & Popowsky, 2019).Unlike NYC, which is concerne.d with parks in New York City, and SITES (V.2), which is concerned with parks only in Oregon, the Sustainable Sites Initiative is a classification system for all types of landscapes, whether the site is an urban plaza, city park, university campus, or corporate headquarters (Steiner & Popowsky, 2019). SITES (V.2) that is broadly generalizable in contrast to the other two systems may create challenges when applied to unique ecosystems (Horsford, 2017).

The previous review shows, that it has been widely investigated, that parks play a positive role in reaching high-quality environmental and social recreational areas that can give the city its aesthetic character. Many studies have analyzed the current state of parks in Egypt with a focus on historical parks characterized by cultural values to understand the causes of deterioration of its urban condition over time. Some researchers have recommended the use of new urban design techniques such as the use of object classification techniques, high-resolution images and multiple spectra to improve park design.

There are also some studies, initiatives and organizations that have taken serious steps toward developing regulations that include criteria for achieving sustainability in garden design. These criteria can be used globally as international criteria and are not addressed in a specific region.

3. METHODOIOGY

The steps for achieving the research aim can be summarized to appropriate a group of criteria, which can guide the urban landscape design of international parks to meet the requirements of sustainability in terms of environmental, economic and social sustainability, as shown in Figure (2).

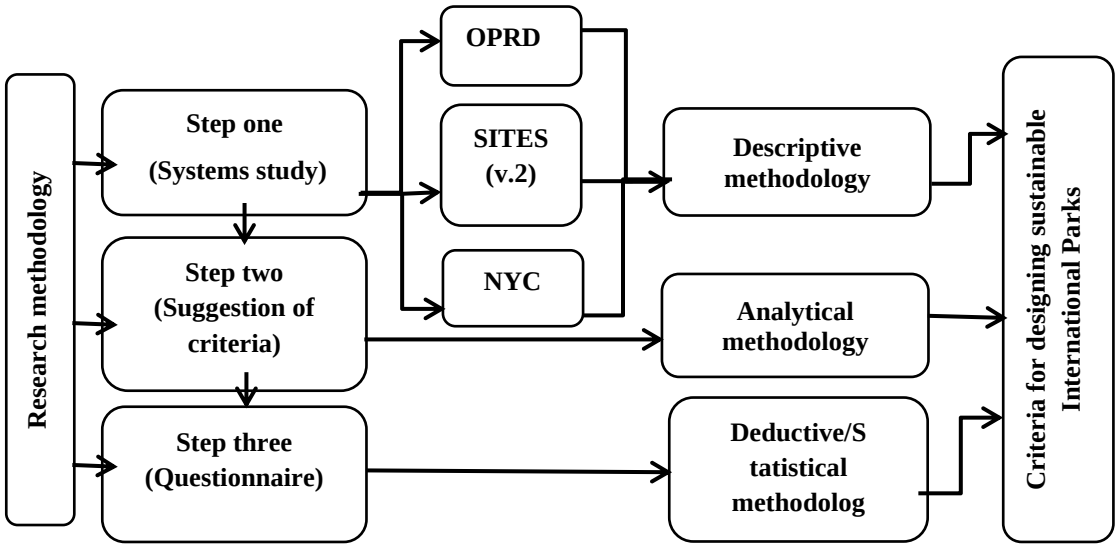

Figure (2): Research Methodology
Source: Author

3.1 Step One (Study of Systems)

Three of the systems that suggest criteria for the sustainability of open areas and parks were analyzed as shown in Figure (3).

Figure (3): Proposed Systems for Designing Sustainable Open Areas
Source: Author

3.1.1 Sustainable Design Strategies for Sustainable Parks According to LEED (Sustainability Criteria for Landscapes - New York City Park, 2011)

In April 2007, Mayor Bloomberg released NYC, a plan to improve New York City's urban environment and quality of life over the next 25 years. This document focuses on a wide range of open spaces, from cultivated traffic islands to urban forests, from pocket boxes to 1,000 acres of parkland.

The goal of creating a sustainable checklist for challenging landscape design was that the landscapes that we build and maintain can address important environmental, social and economic issues, as shown in Table (2) (Adams et al., 2011).

Table (2): Sustainability Criteria for Parks Landscapes Design

Main criteria	Sub criteria
Design	Involve all users
	Involvement of nature
	Reply to the context of the site
Ecology	Support environmental function
	Increased diversity and interconnection
Economy	Flexibility
	Performance
Society	Cooperation and participation
	Public Health
	Education
	Think long term

Source: Adams et al., 2011.

3.1.2 Sustainable Park System in Oregon (Gallagher, 2012)

Oregon Parks and Recreation Administration (OPRD) is a strong supporter of sustainable parks. The overall goal of sustainable parks is to promote the use of sustainable practices, maximize the productive life of buildings and park facilities, and enhance the natural environment (Gallagher, 2012). Figure (4) shows a summary of sustainable (social, economic and environmental) practices that can be used within parks, recreational facilities and open spaces according to (OPRD).

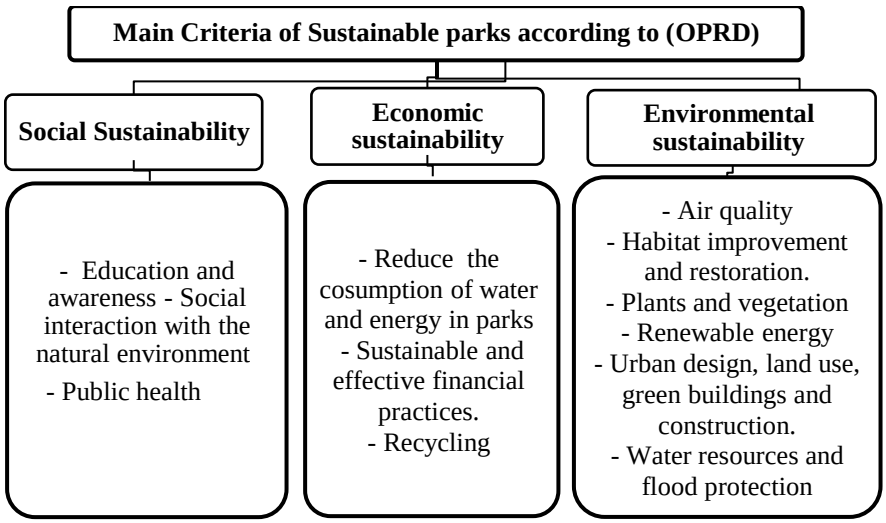

Figure (4): Park Sustainability Standards proposed by Oregon Parks and Recreation Department
Source: Gallagher, 2012

3.1.3 SITES (V.2) Rating System for Sustainable Land Design and Development (SITES - Rating System, 2014)

SITES rating system is owned by Green Business Certification Inc. SITES were developed by a joint, multidisciplinary effort from the American Society of Landscape Architects and the Lady Bird Johnson Wildlife Center at the University of Texas at Austin and the American Botanical backyard. SITES 'key message is that any project, which can be a campus location, park, mall, or even a home, can protect and renew the

benefits and services that healthy ecosystems provide (Sustainable Sites Initiative, 2014).

Prerequisites and credits in the SITES v2 classification system are organized into ten sections, as shown in Figure (5).

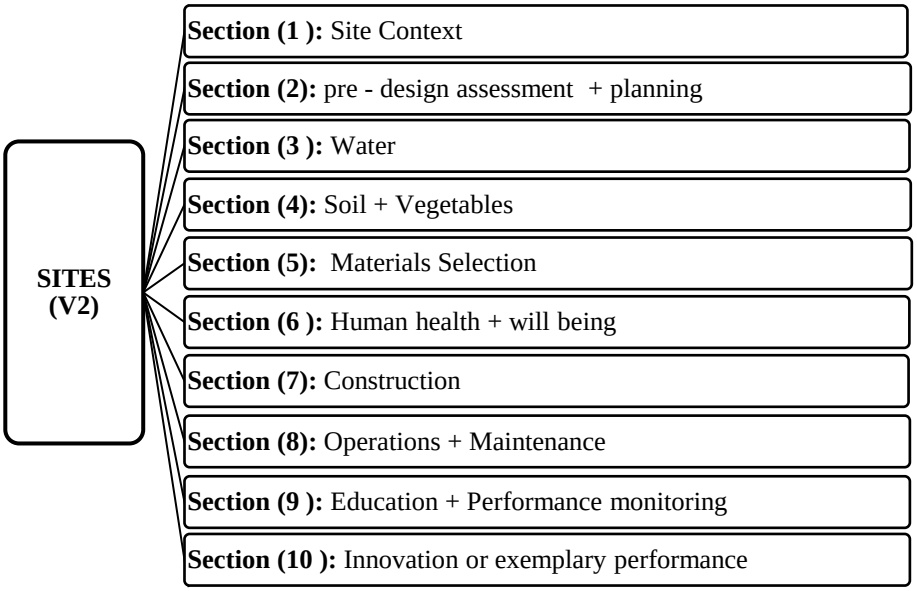

Figure (5): steps categories for Site Sustainability Standards by SITES (V.2) Rating System
Source: Sustainable Sites Initiative, 2014

3.2 Second Step: Defining the Sustainable International Parks Landscape Design Criteria (SIPLDC)

Based on the analysis of the three systems for sustainable urban public spaces (sustainable parks), new criteria have been integrated into the proposed criteria for achieving sustainable design of international parks. The proposed criteria have been classified into (14) categories as shown in Figure (6).

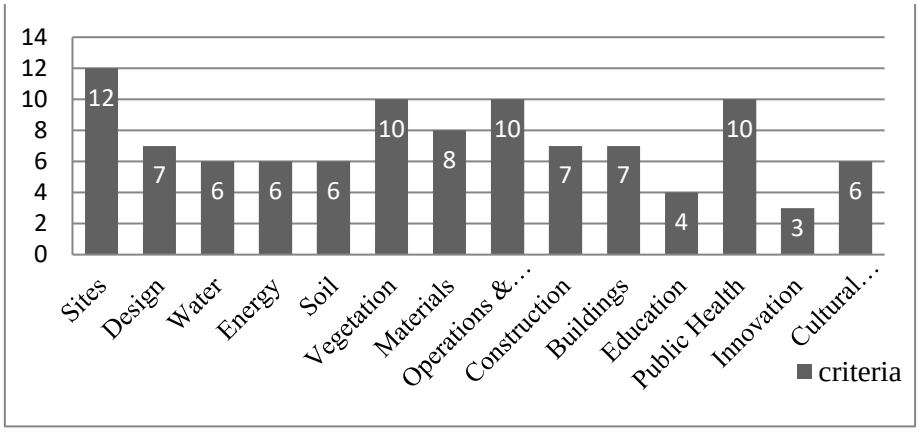

Figure (6): The proposed categories of criteria for designing sustainable international parks
Source: Author

The proposed criteria achieve sustainability in terms of environmental, economic, and social dimensions. As shown in Figures (7) & (8).

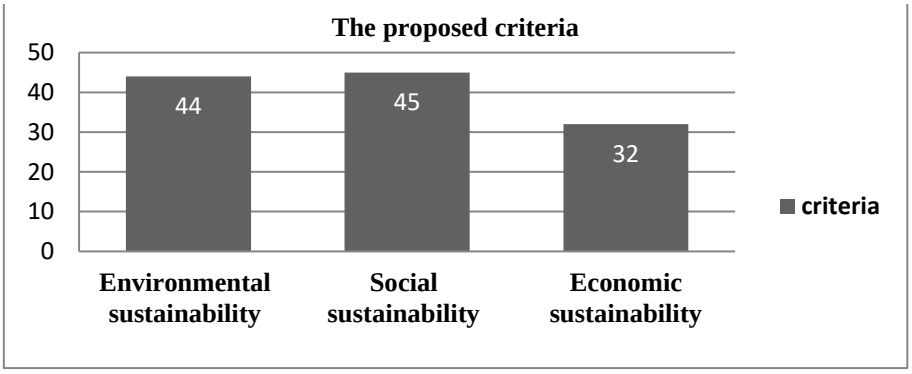

Figure (7): Classification of the proposed criteria according to the three dimensions of sustainability
Source: Author

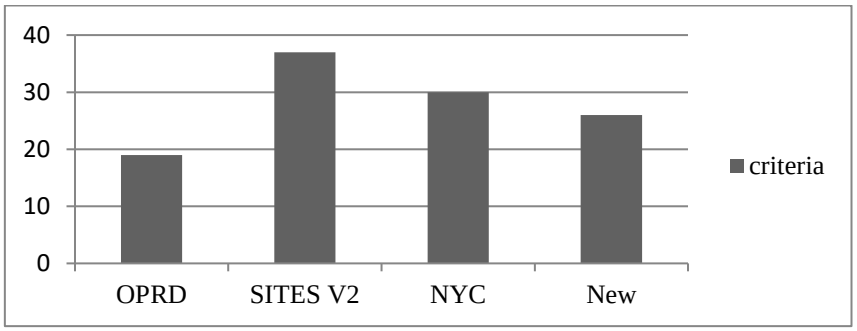

Figure (8): Most of the proposed criteria have been deduced from SITES V2
Source: Author

3.3 Third Step: Validation of the Proposed Criteria

Objective: To validate the proposed set of criteria for designing sustainable international parks and to calculate their relative weights, a questionnaire was designed specifically directed to specialists and experts in the field of urban design. Expert sampling is a method in which participants are selected in a nonrandom manner based on their experience with the phenomenon under study. The advantage of this approach is that experts are more familiar with the topic than non-experts, and opinions collected from a sample of experts are more reliable than opinions collected from a sample that includes experts and non-expert (Bhattacherjee, 2012).

Stage (1): This study targeted at least 300 architects, including; faculty staff from (19) Egyptian educational institutions and holders of Bachelor of Architecture. The response to the questionnaire varied between a group that responded and participated in the questionnaire, another group apologized for not participating because it was not aware of the topic of the questionnaire, and another group ignored (did not respond) to the questionnaire, as shown in Table (3).

Stage (2): Response formats were closed (multiple options). The questionnaire dealt with a wide range of criteria that were divided into (14) categories. Each category contains a number of criteria that were extracted from the three systems in addition to the new criteria. At the end of the questionnaire, experts can suggest additional criteria.

Stage (3): Those contacts with experience in the field were first informed of the survey objectives and response procedures. That wishing to participate in the questionnaire was provided in two ways. The first way is via e-mail, and the second way is by paper questionnaire.

Stage (4): The Faculty staff category's results were authorized since they are better at analyzing than others and are more conscious of the value of the study issue, scientific research. The remaining categories were left out to prevent influencing the experts' actual results.

Stage (5): Data were collected via the web interface (Google Form) and paper questionnaires were unpacked and exported to Excel. The main concern driving the data analysis was to reveal the validity of the proposed criteria and to put weight qualitatively. Basic descriptive statistics were applied, and more attention was paid to qualitative analysis and interpretation of the richness of the data obtained.

Table (3): Participants Classification

No. Samples	Responders	Non-Responders	Apologies for Sharing	Responders	
				non-Staff	Staff
300	98	185	17	71	27
	32.7%	61.6%	5.7%	72.4%	27.6%

Source: Author

4. RESUITS

Using a specific methodology, the questionnaire responses were translated or transformed into relative weights for the proposed criteria, as given in Table (4). The relative weights of the criteria were determined using the approach (3) attempts, with the first attempt using only Ph.D. holders' (Staff) results, the second attempt using only non-Ph.D. holders' (non-Staff) results, and the third first attempt using all specialists' findings. If 50% or more of the sample selected (5) for the criterion, this criterion has been selected to be required. The weight of each criterion has been determined according to the highest percentage of participants who selected this weight. If the criterion gets two equal percentages in two assessment ranges, its weight will be the average of the two assessments. The proposed criteria and their relative weights are shown in Table (5). The proposed criteria have been classified into; criteria, which have been deduced from the three analyzed systems (NYC, ORPD, SITES), new criteria suggested by the researchers Due to as the three systems do not pay enough attention to the cultural aspect of international parks that is the main function of international parks, and criteria have been suggested by the experts who participated in the questionnaire.

Most subjective approaches in use today are based on the opinions of experts. Direct weighting techniques are most commonly used to elicit online preference (Lescauskiene et al., 2020). In direct methods, the decision-maker compares criteria using a ratio scale, while in indirect methods. The weights of criteria are calculated on the basis of the decision-maker's preferences (Pamuˇcar et al, 2018). Direct weighting approaches such as direct rating and point assignment have recently been used in questionnaire-based preference elicitation (Aubert et al., 2020).

Table (4): Concluded Relative Weight for the (SIPLDC)

Criteria	Assessment range in the questionnaire						Relative weight
	0	1	2	3	4	5	
• **Required: if 50% or more of the sample selected (5) for this criterion**							
Ex. Connect to various transport networks	0%	0%	4%	31%	11%	54%	**Required**
• **The weight of each criterion has been determined according to the highest percentage of participants who selected this weight**							
Ex. Preserving existing aquatic ecosystems	0%	4%	4%	11%	50%	31%	**4 points**
• **If the criterion gets two equal percentages in two assessment ranges, its weight will be the average of the two assessments**							
Ex. Highlight the local character through design	0%	4%	8%	35%	15%	35%	**4 points**

Table (5): Concluded Relative Weight for the SIPLDC

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	1-1Ensuring the safety of the site by conducting a comprehensive site assessment before design process (SITES v2)	√	√		required	3 points	3 points
	1-2 Connectivity to various transport networks (SITES v2)		√		required	2 points	2 points

Table (5): Concluded Relative Weight for the SIPLDC (cont.)

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
1-Sites	1-3 Preserving existing aquatic ecosystems (OPRD) (SITES v2)	√			4 points	4 points	3 points
	1-4 Redevelopment of deteriorated sites (SITES v2)	√			4 points	Required	Required
	1-5 Preservation of habitats for threatened species (SITES v2)	√			4 points	3 points	5 points
	1-6 Establishment of parks in packing sites within communities (OPRD)		√		5 points	4 points	4 points
	1-7 Understanding and maintenance of the complex natural relationships between soil, water, and vegetation (NYC)	√			5 points	4 points	4 points
	1-8 Preserving the already existing environmental features (NYC)	√			5 points	4 points	4 points
	1-9 Creating new micro-climates to accommodate specific uses in the site and to expand their seasons (NYC)	√			4 points	4 points	4 points
	1-10 Selection of sites with large spatial capacity that allow future expansion of the park and changes in uses according to changing needs			√	5 points	5 points	5 points
	1-11 Avoiding the very linear sites as well as sites of square shape		√		3 points	3 points	3 points

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	1-12 Selection of sites that linked directly to distinct natural views in the city (NYC)	√			5 points	Required	required
2-Design	2-1 Incorporating the principles of sustainable urban design in the design process (OPRD)	√	√	√	required	4 points	4 points
	2-2 Integration of the principles of sustainable architectural design into buildings and hardscape design (OPRD)	√	√	√	required	4 points	4 points
	2-3 Encourage visitors to sense, experience, and understand the architecture and site design (Quest.)		√		required	4 points	4 points
	2-4 Creating distinguished approach axes to the site that achieves pleasure and suspense (NYC)		√		4 points	4 points	4 points
	2-5 Ensuring integration between different uses and reducing contradictions of uses in the park (NYC)		√	√	5 points	4 points	5 points
	2-6 Highlight the local character through the design of the park		√		4 points	3 points	3 points
	2-7 Integration of users in the design process at various stages to identify their cultural and recreational preferences (SITES v2) (NYC)		√		5 points	5 points	required
3-Water	3-1 Visual accessibility of natural water views surrounding the park		√		required	4 points	4 points
	3-2 Manage rainfall at the site and use mechanisms to benefit from rain water (SITES v2)			√	4 points	5 points	5 points

Table (5): Concluded Relative Weight for the SIPLDC (cont.)

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	3-3 Reduce the use of potable water to irrigate green areas (SITES v2)			√	5 points	4 points	4 points
	3-4 Reduce the use of outdoor water landscape elements (fountains - water pools….) (SITES v2)			√	3 points	4 points	4 points
	3-5 Using porous/permeable sidewalk (NYC)			√	4 points	4 points	4 points
	3-6 Design and installation of central irrigation systems using gray treated water (OPRD) (NYC)			√	4 points	5 points	4 points
4-Energy	4-1 The use of renewable energy sources and installation of solar panels on top of buildings and parking shades (SITES v2)	√			required	5 points	5 points
	4-2 Use LED lighting elements (OPRD)			√	required	5 points	5 points
	4-3 Regular monitoring of consumption rates of water, electricity and natural gas (OPRD)			√	required	5 points	5 points

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	4-4 Reduce energy consumption in outdoor spaces (SITES v2)			√	5 points	5 points	5 points
	4-5 Replacement or renovation of inefficient infrastructure that consumes a large amount of energy (OPRD)			√	5 points	4 points	4 points
	4-6 Selection of raw materials that have an effective thermal performance (heat reflective glass - stones and materials with rough texture - tiles, pottery, palm products ....)	√	√	√	5 points	4 points	4 points
5-Soil	5-1 Develop a plan for soil management and conduct regular soil tests (OPRD) (SITES v2) (NYC)	√			4 points	4 points	4 points
	5-2 Control and management of invasive plants (SITES v2) (NYC)	√			4 points	4 points	4 points
	5-3 Avoiding soil damage by controlling soil erosion and compression during construction (NYC)	√			5 points	5 points	5 points
	5-4 Renewal of existing soil instead of importing new soil materials (NYC)	√		√	4 points	4 points	4 points
	5-5 Treatment of contaminated soil and make them usable as gardens (NYC)	√			4 points	5 points	4 points
	5-6 The use of sufficient quantities of soil with appropriate depths to ensure healthy growth of plants (NYC)	√			5 points	4 points	4 points
6-Vegetation	6-1 Applying environmental approach in agriculture (NYC)	√			required	4 points	5 points
	6-2 Maintain and promote biodiversity	√			required	5 points	4 points
	6-3 Ensure that the park and their uses do not affect the surrounding natural areas and sensitive habitats (SITES v2)	√			required	4 points	4 points
	6-4 Planting local plants and maintain the already existing vegetation (SITES v2)	√	√	√	5 points	4 points	4 points

Table (5): Concluded Relative Weight for the SIPLDC (cont.)

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	6-5 Use appropriate and non-water consuming plants (SITES v2)	√		√	4 points	4 points	5 points
	6-6 Reduce the effects of urban thermal islands by increasing green areas (SITES v2)	√			5 points	4 points	4 points
	6-7 Develop a program to remove non-genetic vegetation from sensitive habitats (SITES v2)	√			4 points	4 points	4 points
	6-8 The use of different and rare plants from different countries (trees, shrubs, grasses, aromatic plants . . .)	√	√		4 points	5 points	4 points

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	6-9 Using plants to reduce noise and prevent unwanted wind from entering the site	√	√		4 points	4 points	4 points
	6-10 Using plants with light green leaves and rough texture		√		4 points	4 points	4 points
7-Materials	7-1 The use of local and regional materials (OPRD) (SITES v2)			√	required	5 points	5 points
	7-2 Avoid using resources that contribute to the destruction of natural habitats and increase global warming	√			required	4 points	5 points
	7-3 The use natural materials	√			required	5 points	5 points
	7-4 The use materials with recycled content (SITES v2)			√	3 points	4 points	4 points
	7-5 Support the responsible extraction for raw materials	√			5 points	4 points	4 points
	7-6 The use of materials manufactured in a sustainable manner (OPRD) (SITES v2)	√			5 points	4 points	4 points
	7-7 Provide general recycling containers in different areas of the park (OPRD)	√		√	5 points	4 points	4 points
	7-8 The use of various materials to express different cultures		√		5 points	4 points	4 points
8-Operations & Maintenance	8-1 Develop a plan for sustainable site maintenance (SITES v2) (NYC)			√	required	5 points	5 points
	8-2 Availability of financial sources for maintenance (SITES v2) (NYC)			√	required	4 points	4 points
	8-3 Eliminating waste, through evaluating and optimizing the full life cycle of products and processes, to approach the state of nature systems in which there is no waste (Quest.)	√			required	5 points	5 points
	8-4 Protection of air quality during landscape maintenance (SITES v2)	√			5 points	4 points	4 points
	8-5 Recycling of organic matter (SITES v2)	√		√	4 points	4 points	4 points
	8-6 Storage and collection of recyclable materials (SITES v2)	√		√	5 points	5 points	5 points
	8-7 Create general information and educational program as part of maintenance and operations (NYC)		√		5 points	4 points	4 points
	8-8 Intergradation of pest management (IPM) techniques in the disease and pest control system (NYC)			√	5 points	4 points	4 points

Table (5): Concluded Relative Weight for the SIPLDC (cont.)

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	8-9 Ensure that long-term maintenance and operational funding does not exceed service costs (SITES v2)			√	5 points	5 points	5 points
	8-10 Assess the impact of sustainable practices on cost (SITES v2)			√	4 points	5 points	5 points

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
9-Construction	9-1 Control of construction pollutants (SITES v2)	√			Required	5 points	5 points
	9-2 Communicate and verify sustainable construction practices (SITES v2)	√		√	5 points	5 points	5 points
	9-3 Protection of air quality during construction process (SITES v2)	√			5 points	4 points	4 points
	9-4 Safe disposal of building and demolition materials (SITES v2)	√			5 points	4 points	5 points
	9-5 Implementation of recycling plan and construction waste management (NYC)			√	4 points	4 points	5 points
	9-6 Develop and implement public information and educational program to raise awareness of the project during the construction period (NYC)		√		4 points	4 points	4 points
	9-7 Provide training for contractor and construction workers on the latest sustainable construction practices (NYC)		√		4 points	4 points	4 points
10-Buildings	10-1 The use of roof gardens and vertical landscaping to reduce energy consumption in the building (SITES v2)			√	Required	5 points	5 points
	10-2 Diversity in building uses which can enhance cultural and recreational functions of the park		√		Required	4 points	5 points
	10-3 Providing children's indoor and outdoor facilities		√		Required	4 points	5 points
	10-4 Display different cultures through the design of architectural facades and structures		√		3 points	4 points	4 points
	10-5 Study the height of buildings to ensure that the important natural views can be observed clearly		√		5 points	4 points	4 points
	10-6 Diversity of fixed and mobile installations to meet user needs		√		5 points	5 points	5 points
	10-7 Availability of center for customer services		√		5 points	4 points	4 points
11-Education	11-1 Provide opportunities for the public to participate in sustainability practices in the garden to raise awareness of the importance of protecting natural resources (OPRD) (NYC)		√		4 points	5 points	5 points
	11-2 Educating children and young people about the importance of international parks (NYC)		√		4 points	4 points	4 points

Table (5): Concluded Relative Weight for the SIPLDC (cont.)

	Criteria	Env.	Soc.	Eco.	Relative Weight Ph.D. (Staff)	Relative Weight non-Ph.D. (Non-Staff)	Relative Weight (All)
	11-3 Provide training and workshops for workers and staff about the sustainability practices (OPRD)		√		4 points	4 points	4 points
	11-4 Availability of research centers in the park		√		5 points	4 points	5 points
12-Public health	12-1 Ensure access for users of different ages and abilities, including persons with motor, visual, auditory or cognitive disabilities		√		Required	5 points	5 points
	12-2 Achieve visual comfort in the park		√		Required	4 points	5 points
	12-3 Improve air quality and reduce carbon dioxide emissions (OPRD)	√			required	4 points	5 points
	12-4 Promote general physical, mental and social health by providing opportunities for interaction with people and nature (OPRD) (SITES v2)		√		5 points	4 points	4 points
	12-5 Participation of public volunteers in the protection, conservation of the park (OPRD)		√		3 points	4 points	4 points
	12-6 Provide external spaces designed to encourage social interaction (OPRD) (NYC)		√		5 points	4 points	5 points
	12-7 Sufficient parking areas (NYC)		√		required	4 points	5 points
	12-8 Achieve thermal comfort in different areas of the park		√		5 points	4 points	4 points
	12-9 On-site food production (SITES v2)		√		4 points	4 points	4 points
	12-10 Green transportation (OPRD)	√			5 points	5 points	5 points
13-Innovation	13-1 Develop innovative programs to raise awareness of the importance of the park		√		5 points	4 points	5 points
	13-2 Develop an innovative plan that ensures the ideal performance of the park		√		4 points	4 points	4 points
	13-3 Support the local economy (SITES v2)			√	5 points	4 points	4 points
14-Cultural diversity	14-1 The use of different architectural styles for buildings, gates and outdoor furniture which reflect local and international cultures		√		required	4 points	4 points
	14-2 Allowing local residents to share their values, habits, and skills with park visitors (Quest.)		√		required	required	required
	14-3 Strengthening the cultural value of the park by increasing the diversity of plants from different countries (NYC)	√			5 points	4 points	4 points
	14-4 Availability of squares and plazas designed to hold festivals of different cultures		√		4 points	5 points	4 points
	14-5 Providing permanent and mobile exhibitions		√	√	4 points	4 points	4 points
	14-6 Availability of different wildlife styles (small zoo, science oasis, wildlife art gallery ...)	√	√		4 points	4 points	4 points

Source: Author Based on Survey Result & Findings

5. DISCUSSION

It was important to validate those results (criteria) by directing the evaluation process towards the public debate (specialists' questionnaire) after picking the three systems and thoroughly researching them using the comparative analytical method and extracting criteria. The results illustrate the amount of specialists' interest in certain categories, with the site category receiving (44 points), vegetation (30 points), materials (23 points), maintenance (33 points), and public health (27 points) out of a possible (330) point. As a result, urban planners must account for this shift in priority from one group to the next.

Direct weighting approaches such as point assignment, and direct classification can be considered as the simplest methods for eliciting criteria (Németh et al., 2019). Direct rating is perhaps the easiest of them all as the weights of the criteria are evaluated by asking respondents only to assign the absolute values of the criteria. Since direct classification does not require any prior learning about the preference elicitation process, it may also be easily applied to weighting of survey-based criteria (Lescauskiene et al., 2020).

Our study has a flaw in that the majority of those who answered the questionnaire were either university professors or urban design academics, and we did not survey the opinion of decision-makers (General Authority for Civilization Coordination). In the future, such perspectives should be sought.

6. CONCLUSION

Parks and open green spaces are of paramount importance to the quality of life in our civilized society. Increasing empirical evidence indicates that the presence of natural assets (such as urban parks, forests, and green belts) and components (such as trees and water) in urban open spaces contributes to improved quality of life, higher efficiency of important environmental services, such as air and water purification, wind and noise energy, and increased local stability. Natural areas provide social and psychological services of great importance to the living in modern cities and the well-being of urban residents. This research paper suggests (14) categories of criteria which can be used for designing and developing sustainable international parks. (102) criteria have been proposed in this research paper based on the analysis of three systems; NYC, OPRD, and Sites V2 and based on the results of the questionnaire which has been conducted and directed to specialists in the architectural field to determine the relative weights of the suggested criteria. Specialists and experts in the field of urban design who participated in filling out the questionnaire suggested adding three criteria in addition to the (73) criteria that have been suggested already in the questionnaire. There are also (26) new criteria which have been added to achieve the three dimensions of sustainability, as shown in Figure (9).

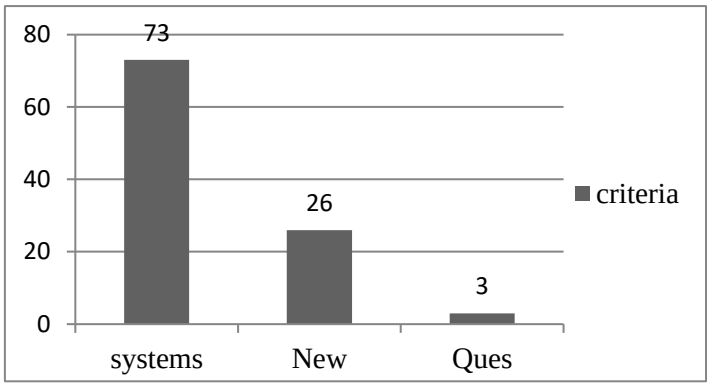

Figure (9): Classification of the proposed SIPLDC
Source: Author

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