Green Zone Planning for City Sustainability

N khaleefah¹, W S Alwan²
Institute of Urban and Regional Planning for Graduate Studies, University of Baghdad, Iraq.

proff.n.khaleefah@iurp.uobaghdad¹, Wafaasabah82@gmail.com²

Abstract: The importance of research has emerged by focusing on sustainable green zone planning to solve the problem of degradation through sustainable strategies, to make green areas determine buildings, not the other way around using GIS, by working on a hypothesis (green areas planning according to an appropriate strategy can sustain cities). The principle of urban planning, urban sustainability, sustainable planning and sustainable cities, as well as urban sustainability and many strategies that support green zone planning and rely on a number of factors for sustainable cities, have been addressed. The research was based on how to plan green areas sustainably, what constraints the planners face in the Dora area south of Baghdad, and the reasons for their deterioration in the urban environment, and after analysing and comparing the changes that occurred over three periods of time (2004 and 2009 and 2019) for 10 residential stores to assess the state of the green areas during that period and how they changed, what problems led to the reduction of areas, increased areas built at their expense, compared to the standards of urban and rural housing in Iraq and the basic plan of the company Paul Servis in 1971, Sustainable planning thus creates a balance in the environment, economy and social values so that these new places meet the work and life needs of the local population and their interests, as one of the indicators of sustainable cities environmental, social and economic, measured by the availability of green and preserved areas relative to population density and coverage, which are one of the most important components of the blocks of urban areas to continue the quality of urban life and environmental and social sustainability, and the ratio of green areas to areas built in a sample of the shop Housing in the study area is very few in most stores and is not in line with international standards, so the current standards need to be adjusted and increased from what they are now, as well as laws in general need to be updated because they are in their current state to achieve the sustainability of green areas in the study area. The most important proposals and solutions that address the problems of green areas (developing a specific strategy, developing some laws on the protection of green areas and setting environmental performance standards for green areas). The research recommended the need to review the planning standard for the individual's share of green spaces as it does not correspond to the increase in population density, and to guide the pursuit of sustainable strategies within the plans prepared by the long-term municipal departments supporting green areas and work to support environmental performance within municipal circles by presenting the award for outstanding environmental performance on conservation capacity and increasing green spaces, urging a focus on the sustainability of Iraqi cities as they suffer from increased desertification and dredging of green areas and current climate change.

Keywords: Urban planning, sustainability, green areas, environmental performance

1. Introduction

Green areas are one of the most important elements of the urban or urban environment, the green areas date back to the past times where they contributed a great deal to urban creativity, and the green areas of the whole world have been of great importance since then to the present day, especially with increased pollution, and is a mirror reflecting the culture of nations and an outlet for the inhabitants of cities from the hustle and bustle of the city.
The research therefore seeks to plan green areas sustainably to solve the problem of degradation by pursuing sustainable strategies, to make green areas the ones that define buildings, not the other way around, and to work towards the creation of a sustainable city through the construction of a strategy that contributes to sustainable city planning based on sustainability elements. Sustainability levels have multiplied over other areas of development, and point to the possibility of dividing the sustainability system into two levels:

The first: the urban level (which deals with its own scale through aspects of the physical and natural environment as well as infrastructure services) is the focus of the research.

Level 2: It is the level of the building (which deals with the interior of the building).

Sustainable space reflects the ways in which the characteristics of a sustainable urban environment are emphasized by integrating strategies with appropriate indicators and mechanisms in implementing objectives governed by standards governed by the participatory approach of specialists and specialists expressing the reality of the state of the study area in order to reach the dimensions of environmental, economic, social and cultural sustainability to achieve healthy communities, intelligent societies, and sustainable knowledge.

To work on sustainable green zone planning to solve the problem of degradation through sustainable strategies, to make green areas determine buildings, not the other way around using GIS, and to work on a hypothesis (green zone planning according to an appropriate strategy can sustain cities).

▸ The problem

The research problem lies in the following questions

How can green areas be planned sustainably, and what are the constraints? And What are the problems and reasons that led to the deterioration of green areas in the urban environment within the city?

▸ Goal:
Planning green areas sustainably to solve the problem of degradation by pursuing sustainable strategies, to make green areas determine buildings and not the other way around using one of the methods of spatial analysis.

▸ Hypothesis
Green zone planning according to an appropriate strategy can sustain cities.

2. The Theoretical Aspect

2.1 Urban planning and city sustainability:

Planning is a special world for each city, which goes into its details to achieve its desired goals in a smooth and flexible way by developing spatial strategies and plans to focus on three main axes (environment, society, economy) to reach the requirements of the population and bring them to a better position.

This high-tech intellectual process is the closest to sustainability, and since it is in its broad sense, many wonder whether it is born. Or is it a way of life that has been and must continue to sustain life to ensure the rights of future generations and achieve maximum social justice by providing the highest levels of national income, individual income and social well-being. Planning determines the shape of sustainable development and the extent to which societies can continue to produce and build themselves through balance between themselves and the surrounding environment, economy and social values, thus encompassing the principle of sustainability, adopting a range of objectives, including (building sustainable cities and communities), the main objective of which is (providing ways to take advantage of green areas and public places) and in safe and inclusive ways for all age groups by 2030. (UN UNDP, 2009).
Economic and social factors, together, determine the sustainable urban shape of the city when taking into account it. This trend in planning and design is aimed at green development that transforms cities from consumer to energy-producing, depending on the city's own resources, as well as focusing on green infrastructure that can be exploited to produce biomass. (Al Yusuf, 2019, p. 5)

Green areas are the most important components of the urban city's blocks, they mainly control the structure of the city based on the function for which they are designed, whether recreational, functional, natural or green belts, each according to its design importance, and the design of the green zone is sustainable when it achieves the basic objectives that make it efficient design. (Recep Efe, and others, 2016, p. 103).

2.2 Sustainable planning:
Definition: Planning generally defines the shape of future development, defines and works to achieve needs, determines the ability of societies to sustain production and revive themselves, sustainable planning works to balance the environment, economy and social values so that these new places meet the work and life needs of local people and their interests, linking these local interests to the world and looking at them within a global economic and social ecosystem, as well as adopting a dynamic process of analysis and encouraging the participation of individuals and discussion and the process of renewing them. The term planning itself includes the principle of sustainability, considering the resources available in a field and programming future plans on a forward-looking basis that takes into account the current situation and links it to the future status of the most important features of sustainable planning, such as management, economy, culture, education, meeting, health, demography, architecture, urbanization.
Features: Planning is sustainable if you take into account:
- Flexibility, i.e. the possibility of modification, review and greeting, and 
- Respect the time dimension and reconcile it with the stages of implementation of the plan.
- Taking into account peace and progression in the planned field. (Urban Engineers Forum).

2.3 Sustainable cities:
It can be defined as a city that is designed to emphasize environmental impacts, and is occupied by residents dedicated to reducing the city's inputs of energy, water and food and reducing its output from waste, gases and contaminated materials. It is a city that provides the needs of its population at present without affecting the needs of the people of the future, and this is based on the basic dimensions of sustainability (social, economic, environmental) so that it is an integrated development process, one dependent on the other. (Al Yusuf, 2019, p4).

The principles of sustainable cities have resulted in several trends in urban design, but can be identified in two basic urban design strategies: The first strategy: which was based on the urban form of the city to achieve sustainability and the strategy of the cities that are integrated.
Strategy II: Based on the environmental factor of achieving sustainable cities through responsive, environmentally harmonious and less environmentally friendly and environmentally depleting architecture. (Al Yusuf, 2019, p4)

2.4 Urban sustainability:
To create a sustainable urban environment, it is important to measure and evaluate policies and infrastructure, social and economic factors, resource use, emissions and any other processes, which contribute to the city and benefit from metabolism, prosperity and quality of life. This will allow city
planning authority officials and governments in general to identify areas of opportunity as well as attention and response by developing realistic sustainability goals with a long-term perspective.

Green areas are one of the most important areas through which sustainability objectives can be developed, namely a space or space located within a residential community or urban area in sites controlled by vegetation, and exists on types such as forests, green belts, agricultural areas, wooded rows located on the edges of roads, which include a set of criteria, the most important of which are: Location, ownership system, space as well as function. It performs an important and very important function in the environmental, health, economic, social and aesthetic field, a place of rest and psychological calm.

Green areas are part of the city's urban environment and play an important role in balancing the urban sector, as they improve the urban living framework. Achieving sustainable development, which takes into account the integration of different dimensions of human development, reducing the effects of economic development and making human beings the focus of all development.

Green urban areas have environmental benefits associated with climate features, improved environment, habitat opportunities, improved aesthetic appearance, improved urban landscape and city vitality, and play a role in improving air quality and urban areas, and reducing noise.

Plants that make up urban green areas reduce air pollution, capture molecules, absorb heavy metals and contaminated gases and carry the task of purifying air. It also reduces the negative impact of urban areas on natural water sources by ensuring the absorption and retention of rainwater, and control of the water system.

The research is concerned with putting forward many strategies supporting the concept of sustainable development and focusing on the strategies most possible to implement by drawing up indicators for each strategy to show their local environmental, social, economic and institutional suitability.

There are a number of strategies whose indicators can be used to propose an appropriate strategy for the study area, in terms of:

- Environmental impact and reduced temperatures,
- Taking advantage of the existence and control of water sources and increasing agricultural production,
- Achieving justice for all segments of society based on standards,
- Increase biomass and ease of movement in green area,
- Interrelated work between the relevant authorities.

Many leading and inspiring countries in applying the concept of sustainable development in green space planning through the development of plans and strategies that take into account the per capita green vacuum and its impact on the health and life of the population by providing the necessary spaces in accordance with population density and achieving mixing of design to suit all age groups. (Al Yusuf et al., 2019, p. 4 and 5).

There are many strategies that support green zone planning and rely on a number of factors for sustainable cities, as in the table below:

- Green patch deployment strategy. (Al-Musawi, 2010, p. 141)
- Quantitative standards strategy for population size. (Beautiful, 2016, p. 230).

The strategy of adopting green environmental infrastructure. (Merabet, 2019,p1

Sustainable urban development strategy. (Kurdosh, 2014, p. 53)

- Green Development Strategy: Green Development & Green Infrastructure
- Low Impact Development Strategy - (LID) (Al Yusuf et al., 2019, p. 4 .5 )Relying on technology and using surveillance systems such as GIS as it gives high transparency and increases the effectiveness of collecting information on the earth Fateen Nabilla Raslia, and others,2019,p(457)
The strategy depends on determining the supply, quantity of service provided, the flow of actual use, demand and the need for recreation as in Table No.(1) . (Marta Suárez and others, 2020, p.134)

| Factor          | Strategy                                                                 |
|-----------------|--------------------------------------------------------------------------|
| Environmental   | - Low-Impact Development Strategy                                       |
|                 | - Green Development Strategy                                             |
| Green           | - Green Environmental Infrastructure Adoption Strategy                   |
|                 | - Green patch deployment strategy                                        |
| Technology      | - Technology strategy in greening KL monitoring project and economic point project using GIS database development system. This strategy, although it provides a high cost to obtain it, gives value to transparency and increases the effectiveness of collecting information on the ground because of understanding events. |
| Standard        | quantitative standards strategy for population size.                     |
| Development     | Sustainable Urban Development - Determining the supply, quantity of service provided, flow of actual use, demand and need for recreation. |

Table No.(1) explains the factors that support strategies

3. Practical Aspect
(Municipality of AL-Dora as a study case)

Located in the southwestern part of Baghdad, one of the municipalities of the capital’s secretariat, al-Dora area owns large areas of green areas, and is one of the large cities in the capital, Baghdad, compared to other areas and cities with an area of 83 km2, and with a population of between 500,000 and 750,000 people, it is on a sectoral level and includes 30 residential localities in addition to the banks of the Tigris River and the southern areas of which are not currently exploited and are green areas within the design.

The name of the course was given in relation to the Tigris River cycle, which rotates around it from three sides, and was first mentioned in the early 19th century AD. The geographical location of the municipality of Dora is E 44.391944, the length of N °33.251389 and 36 m above sea level, overlooking the western shore of Tigris surrounded by an area with dense palm groves. There are many neighborhoods and residential and commercial complexes, such as the teachers’ neighborhood, the Revolutionary district and the mechanic's district.
Figure No. (1) Municipality of The Course based on the satellite image 2019-2020 (Researcher's work)

Figure No. (2) Municipality of The Course based on the 2009 space image (Researcher's work)
After finding out the reality of the situation of the green areas in the study area (municipality of Dora), and after analyzing and comparing the changes that occurred during three periods of time (2004, 2009 and 2019) as in Figure No. (1,2,3), to 10 residential shops, to analyze the state of the green areas during that period and how they changed, what problems led to the reduction of areas, increase the areas built at their expense, compare them with the standards of urban and rural housing in Iraq, and compare them with the basic plan of Paul Serves in 1971.

Referring to the basic design map prepared in advance, we note many excesses on these oppressed areas, which have become the alternative to urban sprawl in construction, as a result of the weakness of local laws and the lack of periodic and serious control that was supposed to do justice to this part of the use of urban land, which as a result led to the deterioration of the reality of the state of the city, which had a negative impact on environmental factors and environmental, functional, social and economic performance of these areas, hence the research to try to find solutions Sustainable planning and environment, through the proposal of a strategy to create a sustainable city adopts solutions to the problems that led to this deterioration, and with the participation of a number of specialists to express opinion and from various parties related to the subject of research, such as the Municipality of Baghdad, the Municipality of Dora, the Urban and Regional Planning Center, the Ministry of Environment and the Ministry of Planning, through the work of an electronic questionnaire, to see the appropriateness of the proposed strategy and the possibility of applying it on the ground.
The results stated:

| Q | Environmental aspect                                                                 | Very weak | weak | medium | strong | very strong |
|---|---------------------------------------------------------------------------------------|-----------|------|--------|--------|-------------|
| 1 | Do you think green zone planning in the cycle area is environmentally friendly and can achieve sustainability goals? | 13.1      | 6.6  | 44.3   | 21.3   | 14.8        |
| 2 | What do you assess the role of public participation in green space planning and can it affect its environmental efficiency? | 19.7      | 13.1 | 19.7   | 32.8   | 14.8        |
| 3 | Do you think that current regulations and laws on green zone planning in the urban environment need to be amended to promote environmental sustainability? | 1.6 I don't agree too much. | 4.9 I don't agree | 21.3 May be | 36.1 I agree | 36.1 I agree too much |

| Q | Social aspect                                                                               | Very weak | weak | medium | strong | very strong |
|---|--------------------------------------------------------------------------------------------|-----------|------|--------|--------|-------------|
|  |                                                                                           |           |      |        |        |             |
1. Do you think that green zone planning in the Dora area achieves aspects of citizens' lives from (safety, proximity, ties and social relations, comfort)?
   - 6.6
   - 13.1
   - 45.9
   - 27.9
   - 6.6

2. Do you think that the current criteria for the per capita share of green space (0.75-2.25) square meters for green zone planning achieve active service to the community in the study area?
   - 14.8
   - 19.7
   - 37.7
   - 27.7
   - -

3. Do you think the current criteria are sufficient for an individual's share?
   - 19.7
   - 24.6
   - 36.1
   - 18
   - 1.6

4. Do you think green zone planning can make society equal in getting a good quality of life in the study area?
   - 1.6
   - 3.3
   - 21.3
   - 52.5
   - 21.3

Q Awareness aspect
   - Very weak
   - Weak
   - Medium
   - Strong
   - Very strong

1. Do you think that awareness of the importance of green zone planning in the urban environment of the course area needs to be activated by the stakeholders?
   - 4.9
   - -
   - 6.6
   - 49.2
   - 39.3

2. Do you think that mass participation in green zone planning in the study area is important in raising awareness?
   - 3.3
   - 3.3
   - 13.1
   - 54.1
   - 26.2

Q General questions
   - Very weak
   - Weak
   - Medium
   - Strong
   - Very strong

1. How much is the contribution (your assessment) to the dissemination of the proposed strategy to the departments and their role in preserving green areas?
   - 8.2
   - 24.6
   - 42.6
   - 18
   - 6.6

2. What proposals and solutions can address the problems of the green areas of the city?
   - 63.9% Develop a specific strategy.
   - 32.8% Reducing horizontal construction.
   - 37.7% Charging a small fee to participate in the preservation of green areas.
   - 62.3% Setting standards for environmental performance for green areas.
   - 82% Introducing some laws on the protection of green areas.

Note: There is - (zero value expresses for lack of vote on the value in question).

Table No. (2) the results of an electronic questionnaire

| NO | Strategy | Assess the extent to which implementation is possible |
|----|----------|-----------------------------------------------------|
|    |          | (0-25)% | (26-50)% | (51-75)% | (76-100)% |
| 1  | Adoption of quantitative criteria for population size | 8.9 | 33.9 | 46.4 | 10.7 |
| 2  | Providing dedicated areas for green areas that fit the total land area and population density | 12.5 | 21.4 | 32.1 | 33.9 |
|   | Description                                                                 | 1   | 25 | 30.4 | 42.9 |
|---|----------------------------------------------------------------------------|-----|----|------|------|
| 3 | Reliance on the environmental factor as the basis for strategic investigation and the trend towards green urbanization | 1.7 | 25 | 30.4 | 42.9 |
| 4 | Obtaining approvals for the purpose of stopping the granting of horizontal and individual building permits immediately and going to vertical construction at high densities to provide green spaces | 19.6 | 26.8 | 33.9 | 19.6 |
| 5 | Periodic monitoring by adopting a database using GIS software to track problems and develop solutions in real time | 3.6 | 8.9 | 32.1 | 55.4 |
| 6 | Organize a database updated annually or semi-annually explaining what possibilities are available to provide green areas or to increase them as much as possible | 1.8 | 7.1 | 35.7 | 55.4 |
| 7 | Imposing symbolic administrative fees for the residents of the region for the purpose of participating in the preservation of the environment and increasing the afforestation of as many areas as possible within their residential neighborhoods, to be a motive for not sabotage and to increase their sense of public participation in the preservation of their city | 19.6 | 17.9 | 35.7 | 26.8 |
| 8 | Activating the awareness role by the municipal circles through mobile teams to raise awareness in not to exceed and damage the green spaces. | 1.8 | 8.9 | 33.9 | 55.4 |
| 9 | Environmental Sustainability Award by stakeholders represented by the Ministry of Environment to encourage circles and instill a spirit of competition among them to preserve green spaces | 1.8 | 8.9 | 44.6 | 44.6 |
| 10 | Adoption of standards for environmental performance by the municipality | 1.8 | 14.3 | 32.1 | 51.8 |
| 11 | Launch of the Award for Outstanding Environmental Performance by the authorities responsible for the development of green areas in the municipal districts represented by the secretariat of Baghdad | 3.6 | 14.3 | 37.3 | 44.6 |
Conclusions:
Sustainable planning works to strike a balance in the environment, economy and social values so that these new places meet the work and life needs and interests of local people, and link these local concerns to the world and are seen within a global economic and social ecosystem. And the Sustainable cities indicators are environmental, social and economic, measured by the availability of green and reserved areas relative to population density and coverage, reducing emissions and measuring the proportion of green jobs in the local economy, the public participation in decision-making can helps increase efforts towards sustainability and may lead to better results for both government and social networking. Green areas are one of the most important components of urban blocks for continued urban quality of life and environmental and social sustainability, and the problems suffered in the green spaces in the study area are random abuses by the citizen, and abuse on the government decisions, high land prices and lack of supply. So, the sustainable planning process derives from many strategies aimed at achieving the concept of city sustainability. The results showed that the ratio of green areas to areas built in a sample of residential shops in the study area is very small in most stores and is not in line with international standards, and this is a serious indication of the lack of regular distribution in them and not considered areas to be planned within the structure of the residential locality, Green areas planning in the study area is not appropriate, although there are some advantages that can achieve sustainability if applied correctly, And all the laws in general need to be updating, and in their current state do not achieve the sustainability of green areas in the study area, So the current urban planning of green areas in the Dora area does not achieve social aspects. The current standards need to be adjusted and increased from what they are now Sustainable green zone planning is capable of making society equal. One of the most important proposals and solutions that address the problems of green areas is (developing a specific strategy, developing some laws on the protection of green areas and setting environmental performance standards for green areas), therefore the vote on the proposed strategy paragraphs and assess the extent to which they can be implemented by specialists in green zone planning and city sustainability (above 50%).

Recommendations:
1. The planning criterion for an individual's share of green spaces should be reviewed as it does not correspond to the increase in population density.
2. Guidance through sustainable strategies within the plans prepared by long-term municipal departments that support green areas.
3. Work to support environmental performance within the municipality by presenting the Award for Outstanding Environmental Performance through the ability to maintain and increase green spaces and the extent to which these departments adhere to certain strategies geared towards sustainability.
4. Obtain the necessary approvals to circulate the strategy proposed by the research to the departments and stakeholders involved in the green zone planning process, and try to apply it to the study area to become a model for the rest of the Iraqi regions and cities because it has advantages to be a sustainable city.
5. Urge a focus on the sustainability of Iraqi cities as they suffer from increased desertification, dredging of green areas and current climate changes.
References:

[1] UNDP in the Arab countries, 2009.

[2] Al Yousef, A.M.D, & Ibrahim, J, & Hussein, M. (2019). Sustainable smart cities (Prospects and Aspirations in the Footsteps of 21st Century Cities) Vision presented to the First Baghdad Conference. (4-5).

[3] Al-Musawi, Mohammed. (2010). The Importance of green spaces and their design systems in cities, Dubai and Sabratha (Model). Geography Magazine, First Issue, 140, 141.

[4] Urban Engineers Forum.

[5] Dr. Abdul Wahab, J. (2016). Future Strategy for the Urban Environment. Journal of Planning and Development. (34), 230.

[6] Kordoush, H. (2014), Strategies for sustainable planning of land uses and the use of available resources in the areas of Kafra Hamra and Hurriyatan, Faculty of Architecture - University of Aleppo. - p. 53.

[7] Merabet, J. (2019), Prospects for environmental development and development - electronic magazine Sustained Cities. Prospects for Nature and Pets. Morocco, p1.

[8] Baghdad Secretariat / Design Department / Geographic Information Department.

[9] Efe, R, Cüreba, I, Gad, A. (2016). Urban green areas and design principles, Environmental Sustainability and Landscape Management, ST. KLIMENT OHRIDSKI UNIVERSITY: (103).

[10] Suárez, M, David N, Barton, Zofie Cimburova, Graciela M, Erik, E. (2020) Environmental justice and outdoor recreation opportunities: A explicit assessment in Oslo metropolitan area, Norway journal homepage: www.elsevier.com/locate/envsci,(134)

[11] Nabilla, F, Devi, K, Siong S. (2019). Analysis of Fragmented Green Spaces in Kuala Lumpur, Malaysia, CHEMICAL ENGINEERING TRANSACTIONS: 978-88-95608-69-3; ISSN 2283, (461).