

AN ANALYSIS OF BAGHDAD'S MASTERPLANS BASED ON THE DEVELOPMENT OF GREEN AREAS

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ABSTRACT

Motives: Baghdad is the capital city and an important political, administrative, social, cultural and economic centre of Iraq. Baghdad's growth and development has been significantly influenced by efforts to accommodate various needs of its steadily growing population. Uncontrolled population and urban growth have exerted negative effects in numerous dimensions, including environmental sustainability because urban expansion occurred in green spaces within the city and the surrounding areas.

Aim: The aim of this study was to examine the planning solutions in Baghdad's green areas in the past and at present, and to identify the key changes in the city's green areas, including changes in the ratio of green urban spaces to the total area of the city. Comprehensive urban development plans for Baghdad were analysed; the main solutions addressing urban green spaces were discussed; the advantages and disadvantages of previous and present urban development plans were examined, and the percentage of green urban spaces in Baghdad was investigated based on drafts of the city's comprehensive development plans.

Results: Baghdad's Masterplan pays considerable attention to the development and preservation of urban green spaces which exert profound effects on the climate, the local environment, the city's aesthetic and recreational value, and its social and economic development. The previous and present masterplans share numerous priorities with the aim of improving the city's environmental and ecological health.

Keywords: green areas, comprehensive development plans, Baghdad city plans

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INTRODUCTION

Over the past decades, the city of Baghdad has witnessed planning attempts known as masterplans or comprehensive development plans, the aim of which was to control and organize the expansion witnessed by the city. These plans dealt with many important aspects and laws in the city, but only the obstacles that these plans faced, they only some small paragraphs that did not have a clear role in the expansions witnessed by the city were applied on the ground.

At the present time, as a result of the large urban and population expansion witnessed by the city of Baghdad, which came instead of green areas and open areas located within the city limits, it has become obligatory for specialists to find planning solutions (especially with regard to green areas) and mechanisms to increase them within the city limits and within the boundaries of the built-up areas, to reduce the environmental and ecological problems that the city suffers from in previous years.

Table 1. Studies that dealt with masterplans and green areas for the city of Baghdad

Research title	Date Issued	Summary about it
The city of Baghdad between the reality of rapid growth and the relay of masterplans and lack of integration of the planning process	2012	The study then discussed the reality of Baghdad and its Master Plan, which was created in 1969 and updated in accordance with the legislation that followed, analyzing the changes and shifts in the city's use. It then focused on a transgressor and random housing by examining statistics and information on the topic. The study comes to a conclusion by identifying certain fundamental and significant characteristics of Baghdad city's reality, as well as its issues and potential solutions
The Effect of Urban Land Use Changing on Green Area Neighborhoods No. 336 & 338 in Baghdad – Case Study	2018	In light of the strategy to provide green spaces in random neighborhoods at multiple levels, beginning with residential clusters, moving through streets and roads pedestrians, and ending at the level of neighborhoods, the research presented its vision regarding the treatment of the adverse effects that were diagnosed
Developing Green Infrastructure for Baghdad City (Iraq)	2018	This study used this innovative strategy for planning to address the issue of green spaces in Baghdad. Baghdad's open green spaces will grow, become more accessible, and foster greater social cohesion as a result of additional areas that have been planned in various parts of the city to be connected to the existing green spaces. Additionally, by lowering air pollution and high summertime temperatures, this interconnection will help to improve the city's environment
The Analysis of Green Areas' Accessibility in Comparison with Statistical Data in Poland	2020	The research addresses the issue of citizens of Poland's big cities having access to public green spaces. The goal of the study is to determine if it is feasible to use the British Accessible Natural Greenspace Standard (ANGSt) approach to estimate the quantity of natural green space
The effectiveness of urban green infrastructure in reducing surface urban heat island	2022	The purpose of this study is to assess the effectiveness of UGI in reducing SUHI in Baghdad city. Risafa municipality was selected as a case study, as it suffers from a high level of SUHI risk. Using a computer climatic simulation program; ENVI-met, the temperature of different surfaces in the study area was assessed, and two typical models were selected. And urban green infrastructure (UGI) represents a vital sustainable strategy that can achieve climate change 'adaptation and mitigation' simultaneously

Source: The researcher (2022).

Therefore, the research will analyze all the previous and current comprehensive masterplans and development plans for the city of Baghdad, especially with regard to green areas and the proposed scenarios for increasing these areas and the extent to which they achieve the international standard regarding the percentage of green areas for one person, in order to build a preliminary idea about the possibilities of future development and the possibility of add these scenarios to the development of the city of Baghdad.

Where the research assumes that green areas are the basis for solving many of the environmental and ecological problems that cities suffer from at the present time.

Many studies that dealt with green areas, as well as the masterplans of the city of Baghdad, including:

So the aim of this study is to follow up and analyse all the masterplans for the city of Baghdad to clarify the most important scenarios that it put forward in order to increase the percentage of green spaces within the city, as well as to clarify the percentage of green spaces for each person for each master plan.

THE RESEARCH PROBLEM

The shortage of green areas within the city of Baghdad at the present time, as well as the ratio of green areas to one person, despite the proposed development scenarios in the previous comprehensive development plans for the city of Baghdad.

MATERIALS AND METHODS

This research will depend on the analysis of the drafts of the previous comprehensive development plans for the city of Baghdad by adopting the indicator of the green areas proposed by these drafts for the future plans of the city of Baghdad, and the extent of their achievement of the approved international standard, and an attempt to clarify the most important scenarios adopted in these drafts to increase the green areas within the city of Baghdad, to benefit from them in the developments future.

GREEN AREAS IN THE CITY OF BAGHDAD

Baghdad, Iraq's capital and largest metropolis, is the country's largest city. It is located on both sides of the Tigris River and divides it into two parts: Rusafa on the Tigris' eastern shore and Karkh on the Tigris' western shore. And it is in an astronomical site at which latitude (°33 36 18) intersects in the north and longitude (°44 23") to the east, and as for the province of Baghdad, it represents a percentage of (1.11%) of the total area of Iraq

Its location is in the centre of Iraq. Its climate is semi-continental, hot, dry in summer, cold and rainy in winter, with short spring and summer seasons. It does not differ from the general climate prevailing in Iraq. The height of the Baghdad region is about 32 m above sea level, and the area of Baghdad Governorate is (4555 km²). The city of Baghdad constitutes 20% of the area of the province, and the area of the city is (929 km²). It borders the province of Baghdad from the north (Salah al-Din) and from the east (Diyala and Wasit) and from the south (Babil and Wasit) and from the west (Anbar) (Al-Sheikhly & Al-Taie, 2018).

The green areas required to be available in the city of Baghdad depends on its population, so the population census in 1956 represented (612,000 people), and the population of Baghdad reached (1.5 million people) in 1966, and more than (6 million people) in 2010, with the total population predicted to reach (11.4 million people) by 2030 (Khatib & Alami, 2014).

Since Baghdad's founding, it has developed a strong interest in recreational facilities, open spaces, and parks, with the term Baghdad being linked with the word's paradise, garden, and orchard (Salih & Ismail, 2017).

The types of green areas in the city of Baghdad can be divided into:

1. Public Green Areas: They are designated for public use. However, Baghdad's modern parks, can be divided into three periods depending on the highlights that changed the role and proportions of green areas within the city:
 - a. First Period: The interest in green areas and afforestation in the city of Baghdad goes back

to previous of the twentieth century, as the beginning of the establishment of gardens in the city dates back to the 1920s, when the first public garden with the features of modern gardens was established, during this period, a lot of parks, gardens, and squares were built in Baghdad. Also, the foundation of the Parks Directorate, which is an agency concerned with the building of public spaces and parks in order to improve the environment and provide opportunities for recreation and relaxation for people (Salih & Ismail, 2017).

- b. Second Period: As a result of the horizontal expansion that took place in Baghdad and the establishment of many new residential neighbourhoods during that time period, and the increase in the area of tiling, the Capital Mayoralty found itself facing many problems, including the lack of green space. In order to protect the residents of Baghdad, from the harsh climatic conditions, and to compensate for the lost orchards as a result of the expansion, there was great and growing interest in afforestation of neighbourhoods and streets (Hamdan, 2017).
 - c. Third Period: It is the period of wide change of gardens in Baghdad. Three large parks were built (Al-Shula, Al-Zafaraniya and Al-Thawra) and large areas were planted in these areas, providing all amenities for the citizens (Abdul Raheem & Abdul Razzaq, 2018).
2. Private Gardens: their area is distributed according to the area of the residential plot. There are large gardens whose area of the residential plot reaches 1000 m, while the areas of old Baghdad are devoid of gardens due to the small area of the residential plots (Al-Zubaidi, 2013). Even these large private gardens are becoming rare.
3. Agricultural Areas: Orchards: There are several areas in the city of Baghdad that are planted as orchards, including:
- a. In the northern part of Baghdad on both banks of the Tigris River.
 - b. In the southeast of the city along the Diyala River.

- c. In the southern part of the city, on the fringes of the Al-Khair River, which was buried.
- d. In the western part of the city (Akerkov). These are agricultural lands scattered inside and outside the city.

The agricultural lands within and outside the borders of the Mayoralty of Baghdad are of importance to the city of Baghdad. In addition to providing Baghdad with agricultural crops, it works to improve the climate and is a resource that can be exploited for entertainment purposes (Hamdan, 2017).

4. The Green Belts: It was proposed to establish a green protective belt in the comprehensive development plan for Baghdad approved in 1973 in the area between the end of urban borders and the borders of the Mayoralty of Baghdad to form an isolation area between the city and its neighbourhoods that includes activities with low-intensity building uses on the one hand and to create green open areas and serve as windbreaks. No real interest was found during the previous stages in this project, not to mention the cutting down of many existing trees as a result of the difficult economic conditions (Municipality, 2010).

From all of the above it is clear that the green areas in the city of Baghdad did not come according to a prior planning commensurate with the size of the population on the one hand and with the size of the city on the other hand, but came according to random choices or relying on parts of the proposals of some development plans and neglecting other proposals, as well as the disappearance of and the removal of many of these areas, especially the orchards and the green belt area, as a result of the expansion of the city and the uncontrolled increase in the population.

PLANNING GREEN AREAS IN THE CITY OF BAGHDAD

Several comprehensive development masterplans and designs were relied upon to develop the urban environment of the city of Baghdad. Open lands and green areas had an abundant share of them, and the most important of these designs are:

1. Master Plan for Minobrio & Associates for The City of Baghdad 1956

The IDB (Iraqi Development Board) and the mayor of Baghdad contracted the town planning firm Minobrio & Associates in 1954 to prepare a study of the old urban centres and to develop a master plan for the city of Baghdad.

The design envisions a twenty-kilometre north-south extension and a fourteen-and-a-half-kilometre east-west extension of the city, “with the entire ovoid-shaped metropolis encircled by a rural belt” (AL-Taie, 2019)

Adoption of the master plan good design criteria for green areas, as well as giving special importance to the Tigris River and attention to the need to create open spaces and movement paths along the banks of the river in Baghdad.

As well as the establishment of the green belt for the city of Baghdad, and attention to the hierarchy of green areas within the city. In addition to all this, the masterplan is characterized by flexibility and is subject to change according to any emerging circumstances (Jaafer, 2019).

Also, the planning criteria proposed by the master plan are that the percentage of green spaces amounting to 9.7% of the total urban area, which is not considered a high percentage because it does not include the area that will be occupied by the green belt (Albadri, 2013).

2. Doxiadis Associates Master Plan for The City of Baghdad 1959

The Doxiadis Foundation was commissioned by the Reconstruction Council to prepare a Basic Design for Baghdad around the year 1956, taking into account the design prepared by (Minobrio & Associates).

Where the subsequent consultant presented a completely different design from the previous one and covers an area of (500) square kilometres, which is equivalent to two and a half times the area proposed by the previous design, and represents a rectangle with dimensions of (18x31) square kilometres. The scheme can accommodate (3) million people. Giving clear

attention to the Tigris River basin and its vicinity (AL-Taie, 2019).

The Basic Design contains five main sectors whose borders are clear natural or artificial beams such as rivers or main highways. Each sector accommodates half a million people, and contains (14) small independent housing units, each with a capacity of (50–100) thousand people.

The plan suggested preserving the existing orchards and keeping them in the form of open spaces and making them areas for meeting and recreation, as well as paying attention to the green spaces adjacent to the Tigris River. The plan also suggested the possibility of horizontal expansion away from the course of the Tigris River. Among the most important planning proposals made by the presented design, is the proposal of three irrigation canals parallel to the Tigris River. One of them was implemented in the early sixties of the last century and was called (The Army Canal) (Jaafer, 2019).

The plan also suggested that the percentage of green areas be 3 square meters per person, and this includes parks and recreational areas, as well as 2 square meters per person of playgrounds and kindergartens, in addition to 12 square meters per person of private gardens (Albadri, 2013).

3. Comprehensive Development Plan for Law 156 Of 1971

Comprehensive Development Plan prepared by the Polish institution of Polservice and it is in two phases, the first in 1967 and its target year 1990, while the second phase was prepared in 1973 and its target year 2000, and this design expected that the population of the city of Baghdad in the target year would reach (6–6.5) million people This design represents the first urban planning in the history of Iraq that is characterized by the strength of legal obligation, and it has worked to achieve two goals: (Ismael, 2015).

1. The first goal is to increase the amusement areas and parks from (3) square meters per person to (14) square meters per person. Except for the green areas in sports stadiums and children's play parks –

which he determined with the standard (2 square meters per person) – and the standard of private home gardens that he assumed with the standard (12 square meters per person), which in total is (28 square meters per person) as shown in Table (2) (Jaafer, 2019).

2. The second goal is to create a coordinated system for forests and protective belts in the north western part of the city and orchards – and open gardens, while providing easy access to them.

Table 2. Clarifies the standard for green areas according to the comprehensive development plan – Polservice

Dedicated Green Areas	Specific Standard (Square Meters Per Person)
Central parks and squares	4.00
Neighbourhood and local parks	8.00
City Edge Gardens	2.00
Sports playgrounds and children's playgrounds	2.00
Private home gardens	12.00

Source: The researcher (2022).

The urban plan included the allocation of approximately (4,180) hectares for the use of open land and green areas that include park areas, suburban amusement centres, playgrounds, preserves and picnic sites outside the city. Accordingly, the master plan for the city of Baghdad allocated the following structure for entertainment and leisure areas according to the type of use and its intensity (Al-Zubaidi, 2013).

1. Recreational areas in residential neighbourhoods.
2. Recreational areas in residential sectors are designated for playgrounds Central entertainment areas in two locations, the first west of the Tigris for (Um Al-khanazir) Island, and the second east of the Tigris for the area between the Highway and Army Canal.
3. Outdoor recreation areas located within the green belt.

The plan also addressed the city's economic foundation by identifying three agricultural production zones: palm and citrus orchards, seasonal agricultural production zones, and nurseries. And the Tigris River was divided into three sections in the urban plan:

1. The northern section, which is represented by the green areas north of the city, which include orchards, gardens, forests, and entertainment areas.
2. The central section, which is the area in which the business and activities associated with it are focused.
3. The southern section, which is the area in which the industrial and storage activities are located, which is surrounded by a belt of open green areas (Hamdan, 2017).

It appears that the comprehensive development plan paid special attention to allocating adequate areas for open green areas that are directly related to the city's social and urban progress, as well as its ecological aspects, taking into account the social, economic, and environmental impacts of these areas.

4. Integrated Development Plan for The City of Baghdad 2001 – JCCF Japan in 1987

After the failures that accompanied the comprehensive development Masterplan for the year 1973, neglecting the implementation of any of the (home gardens standard, hierarchy, construction of sports fields, green belt, river banks development), After the matter was rectified, the Baghdad Mayoralty called for the need to prepare a new Masterplan that would overcome the defect in the previous Masterplan and correct its course.

It commissioned the Japanese consultative group JCCF in the year 1987 to prepare a new planning study for the city of Baghdad. However, it was not able to be completed due to the country's passing through the conditions of wars and siege at that time (Jaafer, 2019).

The integrated development plan for the city of Baghdad 2001 is the first study presented at the level of the region, it does not stop at the city of Baghdad only, but also extends to the surrounding areas of Greater Baghdad as it is directly affected by the urban development process. He gave extensive analyses of the sites of open spaces, including green areas, and highlighted their aesthetic and environmental importance, and tried to nature and the urban

environment to form the character of the city. It was scheduled to adopt the standard per capita share of open spaces and green areas (11 square meters per person) (Hamdan, 2017).

This study remained in its initial stages, but it laid down important lines with regard to green areas. The most important statement in this regard is the following:

1. Reducing the planning standard for green areas from its predecessor in the comprehensive development plan of the Pulse Service Corporation in 1973, from (28 square meters per person) to (11 square meters per person), excluding sports playgrounds and children's and youth playgrounds, as shown in Table (3–2). As the integrated development plan (ICDP) seeks to reduce the standard for green space to be more achievable, it assumes an area of (3 square meters per person) instead of (4 square meters per person) for local parks, and an area of (6 square meters per person) instead of (8 meters) square person) for neighbourhood and sector parks, while maintaining the city edge park standard as it is (2 square meters per person). It excludes sports playgrounds and children's playgrounds, which it set with the standard (3 square meters per person), and neglects the home gardens standard – which remained illusory and unfulfilled – and thus the total has been reduced from (28 square meters per person) to (14 square meters per person) (Jaafer, 2019).

Table 3. A comparison of green areas between the 1973 development plan and the 1987 integrated plan

Dedicated Green Areas	Specific Standard (1973 – CDP) [m ²]	Specific Standard (1987 – ICDP) [m ²]
Central parks and squares	4.00	3.00
Neighbourhood and local parks	8.00	6.00
City Edge Gardens	2.00	2.00
Sports playgrounds and children's playgrounds	2.00	–
Private home gardens	12.00	–
Total	28.00	11.00

Source: The researcher (2022).

2. Dividing the spatial space of the green areas in the city into (Hamdan, 2017):

- a. The city centre/ includes attention to parks, forming a link between the river and the land, establishing the principle of long spaces parallel to traffic axes such as Airport Street, and taking care of wide squares.
- b. City edges/To limit outward expansion of the city, it has been proposed to remove urban areas towards the city edges, creating urban strip corridors to isolate urban areas from noise and pollution as the Army Canal axis.
- c. Tigris River/Dividing the area of the river into five secondary areas, ranging between recreational and functional, and the establishment of recreational areas on the two banks of the river in the Mayoralty of Kadhimiya and Al-Aras Island. The river provides water transport and can be used for recreational purposes.

However, the plan stopped working, and no paragraphs were implemented. It is clear from this that the integrated development plan gave extensive analyses of the locations of the open spaces, including the green areas, and highlighted their aesthetic and environmental importance, and tried to combine nature and the urban environment to form the character of the city at a time when it was scheduled to adopt a standard of 11 for a person from the green and open areas, it is acceptable at the local level if it is assumed that the majority of the population owns or owns open spaces of their own (Dawood, 2020).

5. The Comprehensive Urban Development Project for the City of Baghdad 2015

A working team was formed from the Mayoralty of Baghdad/Design Department and professors from the College of Engineering/University of Baghdad, to prepare a base plan for the city in its target year 2015.

1. The first phase began in 1998, which is the phase of collecting information and diagnosing problems and priorities.
2. The second phase was aimed at developing suggestions, alternatives, planning solutions and the

formation of strategies to be agreed upon with various parties.

3. The third and final phase is devoted to developing detailed urban designs for each job and using the Basic Design to become in an executive form on the basis of which construction and reconstruction permits can be granted (Hamdan, 2017).

Two alternatives were adopted for the proposed strategy, based on the following factors: (Jaafer, 2019).

1. The First Factor: The Principle of Development.
2. The Second Factor: Dealing with The Tigris River.
3. The Third Factor: The Adoption of Standards.
4. The Fourth Factor: The Concept of Paths (Connecting Elements).
5. The Fifth Factor: Dealing with The Phenomenon of Uncontrolled Growth.
6. The Sixth Factor: Dealing with The Concept of The Environment.
7. The Seventh Factor: Dealing with Abuse

The proposed standards for green and open areas in the urban development plan is (17 square meters per person). The alternative that was proposed by the urban development plan is to develop green and open areas (Al-Zubaidi, 2013).

This proposal was based on the following aspects: (Hamdan, 2017)

1. Agricultural Areas
2. Public Parks
3. Private Gardens
4. The Belt of The City

The urban development plan has put in place important strategies in the field of development for open areas as well as dealing with the Tigris River and its dependence on standards up to (28 square meters per person), and this is what was not developed by any previous plan for the city of Baghdad. However, this comprehensive plan was not implemented (Al-Zubaidi, 2013).

6. Baghdad City Comprehensive Development Plan 2030 / Khatib and Alami

In 2007, the Baghdad Mayorality referred the project for preparing the masterplan for the city of Baghdad 2030, to the Lebanese office of Al-Khatib and Alami. And the project was divided into four phases (Khatib & Alami, 2008; Khatib & Alami, 2011; Khatib & Alami, 2014):

1. The First Phase / Basic Report (review of past experiences, status quo, and trends) 2010.
2. The Second Phase / Development blueprint alternatives and strategies outline 2012.
3. The Third Phase / Detailed preparation of the comprehensive development plan for the city of Baghdad and review of action plans 2012.
4. The Fourth Phase / Final versions preparation of the comprehensive development plan and preparing for implementation 2014.

The master plan came with a set of objectives that deal with major problems that would affect the environmental aspect of the city of Baghdad directly or indirectly, including:

1. Measures to Plan for Continued Population Growth: There is a need for long-term strategies to manage growth, given that the city is attracting high population growth, and to develop sound policies to accommodate informal settlements.
2. Inadequate Social and Public Infrastructure: public spaces, health and educational institutions, community centres, and so on. There is a need to maintain public parks and existing parks, as well as to construct additional green areas in and around the city and its surroundings.
3. Deterioration of The Urban Environment: The environmental sustainability of the urban environment and the levels of different types of pollution can now be seen as a decisive factor in the quality of life for the residents of Baghdad. As there are no tangible general indicators that accurately measure environmental sustainability in Baghdad and its surrounding areas.

The comprehensive development plan sets the desire for a future vision for the city of Baghdad inspired by the ecological and environmental spirit of the place. And to be a green capital and a sustainable city, by reframing the scenes and green spaces for Baghdad in 2030 to restore its natural heritage as a city of gardens on the Tigris River, and the capital of Iraq.

6-1 Planning and methodology of green and open spaces

The population of the city of Baghdad in 2010 was estimated to be about 6 million, in addition to approximately 3 million others in nearby cities within the greater Baghdad area, where many people commute daily to the city. It is likely that the population of the city and its surrounding area will nearly double between the project base year 2007 and the year 2030.

The preliminary report of the third phase indicated that until 2004 (60%) of the Basic Design area of 1967 was in the form of an urban area. Meaning that the remaining areas are in the form of vacant lands, green or non-green open spaces or unused spaces, but adding to that in 2011 Significant violations of these areas became (80%) of the total area allocated for the Basic Design of 1971 in the form of urban areas. Transformed a group of fragmented pieces, which made it unable to perform the purpose of its establishment. and the green belt has been bypassed by rapid and uncontrolled urbanization, and what remains of it today are only fragmented plots, which makes it useless and unable to fulfil the purpose of its establishment.

Where the development plan presented a set of recommended measures in the draft for the strategy of land use, planning and growth management, which aims to achieve control over the increasing population growth in order to increase the green and open spaces within the city. In order to increase in the percentage of green spaces and improve the environmental and ecological aspects of the city (Khatib & Alami, 2008; Khatib & Alami, 2011; Khatib & Alami, 2014):

1. Removing the current fragmented green belt and moving it west to the new area outside the current borders of the Baghdad Mayoralty.

2. Establishing new growth poles or satellite centres to accommodate future growth and reduce pressures on the central business area and prevent encroachment on green and open areas within the borders of the Mayoralty.
3. Establishment of new high to medium density residential areas on the edges around the “growth poles” to rationalize the uncontrolled urban expansion that occurred in these areas, and with a view to absorbing part of the population increase in the future
4. Establishment of new low- to medium-density residential areas in the new areas surrounding Mayoralty of Baghdad in order to accommodate the remaining population increases in the future.
5. Construction of 4 large industrial zones in the new area.
6. Transferring harmful industrial uses from within the Mayoralty of Baghdad to these areas, and transforming the vacated lands into central parks and green areas.
7. Construction of two large suburban parks in the north and south in areas of outstanding natural beauty.
8. Dividing the remaining lands in the new area into agricultural lands/green and open spaces.
9. Protection of the remaining agricultural lands within the boundaries of the Mayoralty of Baghdad.
10. Acquisition of the maximum amount of remaining vacant land and its allocation as local municipal parks.
11. Benefiting from the large vacant plots that will be vacated within the Central Business District (Al-Muthanna and Al-Shaljiyah), for the purpose of implementing prestigious, large-scale and first-class projects, in order to improve the image of the Central Business District of the city of Baghdad.
12. Re-signing the planned ring railway line and proposing an external fifth ring road to contain the new city and reduce the penetration of transit traffic (especially trucks) to urban residential areas, which is considered to have a negative environmental impact on the city and an increase

in pollution rates within the city, which reduces the ecological aspects of the whole city of Baghdad. As well as completing the implementation of the Baghdad Marina river transport project, especially in areas that suffer from traffic jams and high population density, such as the centre of the capital, Baghdad.

However, among the negatives that are recorded on the comprehensive development plan, especially at the present time, that is, more than 7 years after the completion of the fourth phase, with regard to the environmental and ecological aspects of the city are:

1. The plan did not give a clear criterion for the percentage of green and open areas for one person, and the way they are distributed within the city.
2. The plan confirmed the assimilation of the population within the master plan and in nearby cities within a radius of 30 km from the city centre, but the methodology changed to increase the horizontal expansion of the current plan and absorb the overpopulation in the newly expanded areas horizontally, which is one of the negative things (horizontal expansion) due to the increase in costs Foundation structures and consumption of agricultural land and green/open areas around the city.
3. The plan adopting the plan on the reality of the city of Baghdad for the years 2010–2011 to analyse the uses of the land and give its suggestions, which makes it unimplementable at the present time in many paragraphs and proposals due to the great change that occurred throughout the city and the change in the proportions of different land uses.
4. The plan failed to clarify the risks assessment, possibilities, and difficulties in achieving each of the developed scenarios and the specialization of green areas and the increase of their percentage within the city of Baghdad.
5. The plan did not give a clear weight to the proposed spaces to increase green areas in increasing their percentage within the city.

Through the analysis presented of the drafts of the comprehensive development plans in all its phases, it can be said that the plan came to solve the problem

of the city of Baghdad by focusing on a set of scenarios, especially with regard to the environmental and ecological aspects of the city. These scenarios and suggestions are presented in Table 4.

RESULTS

From the above review of the Baghdad's masterplans, it turns out that it pays great attention to green areas, their development and preservation, because of their many effects in terms of climatic, ecological, aesthetic, recreational, social and economic terms. And there is a set of priorities and main points that all previous masterplans for the city of Baghdad share, which in turn work to increase and improve the environmental and ecological aspect of the city, including:

1. The necessity of dealing with the population increase and urban sprawl on green areas, as it is one of the most important reasons for the city's loss of ecological aspects and the increase in pollution rates, which was clearly reflected on life in the city of Baghdad.
2. Dealing with the Tigris River and its banks, starting from dividing it into a group of sectors and focusing on turning it into green areas, especially in the northern and southern parts of the Tigris River.
3. Preserving orchards as green areas within the city of Baghdad and preventing encroachment on them, for their great role in improving the ecological and environmental aspect of the city.
4. Most of the masterplans stressed the need to establish a protective green belt for the city of Baghdad, with the possibility of using it as recreational areas and open green areas for rest.
5. Most of the masterplans emphasized dealing with the main axes of movement and the necessity of afforestation of the sides and median islands to raise the ecological aspect of the city.
6. The need to deal with the hierarchy of green areas within the city.
7. It is necessary to surround the industrial areas and polluted activities with a belt of green areas and orchards, which reduces the amount of environmental pollutants produced by these areas.

Table 4. the outlines the previous masterplans for Baghdad's city and the most essential aspects of them in terms of green areas

No.	Masterplans	Name of The Design Firm	Year of Preparation	Green Area Standards	The Important Points Related to Green Areas
1	2	3	4	5	6
1	Master Plan for Minobrio & Associates	Town Planning Firm Minobrio & Associates	1956	–	<ul style="list-style-type: none"> • The Tigris River is given special attention, with focus on the necessity to create open areas and movement corridors along the Tigris river banks in Baghdad • Establishment of the green belt for the city of Baghdad • Attention to the city's green space hierarchy
2	Doxiadis Associates Master Plan	The Doxiadis Foundation	1959	17 m ²	<ul style="list-style-type: none"> • Conserving existing orchards and turning them into open spaces that can be used for meetings and relaxation • Paying attention to the green spaces adjacent to the Tigris river • Three irrigation canals proposed parallel to the Tigris River One of them, known as, was adopted in the early 1960s of the previous of the twentieth century (The Army Canal) • Neglecting the hierarchy of green spaces at the city level, but only at the neighbourhood level
3	Comprehensive Development Plan for Law 156	The Polish institution of Polservice	The first phase 1967 The second phase 1973	28 m ²	<ul style="list-style-type: none"> • Suggesting a hierarchy of green spaces within the city of Baghdad • Reducing the increasing population densities in some areas by providing green areas within the same area in order to reduce the building mass • Create a coordinated system for forests and protective belts in the city's north western side, as well as orchards and open gardens • Benefiting from the Army Canal Road axis through afforestation of unoccupied places on both sides of the road and its prohibitions, as it is a huge axis that positively influences the ecosystem's work when afforestation occurs • Creating Al-Zawraa Park as the city's major park, as well as a second park in the Rusafa district • Considering the hierarchy in the design of green areas based on their gradation (city, sector, neighbourhood, locality)
4	Integrated Development Plan	The Japanese consultative group JCCF	1987	11 m ²	<ul style="list-style-type: none"> • Opening up the riverbank to provide leisure opportunities for the general public and to develop open green spaces • Existence of a buffer zone for industrial regions and fields, which uses green squares to limit noise, visual, and environmental pollution from entering the city • Interest in the rivers and their banks and the promotion of direct communication with them, within the city of Baghdad (Tigris River, Diyala River and Nahr al-Khair) • Preservation of palm groves on both sides of the river banks • Reinforcement of pedestrian paths on the banks of the river through fencing to provide shade and by preventing the construction of buildings separating the river • Preserving the hierarchy of green areas in a more integrated and interconnected form for the city • In order to reach an achievable standard and to overcome the failure of the previous proposal, this study suggested reducing the planning standard for green space, from (28 m² per person) to (11 m² per person) • Creating urban strip corridors to isolate urban areas from noise and pollution as the Army Canal axis • Dividing the area of the river into five secondary areas, ranging between recreational and functional

cont. Table 4

1	2	3	4	5	6
4	Integrated Development Plan	The Japanese consultative group JCCF	1987	11 m ²	<ul style="list-style-type: none"> • Interest in the rivers and their banks and the promotion of direct communication with them, within the city of Baghdad (Tigris River, Diyala River and Nahr al-Khair) • Preservation of palm groves on both sides of the river banks • Preserving the hierarchy of green areas in a more integrated and interconnected form for the city • In order to reach an achievable standard and to overcome the failure of the previous proposal, this study suggested reducing the planning standard for green space, from (28 m² per person) to (11 m² per person) • Develop a proposal to take advantage of the historical sites in the city as open green areas • Creating urban strip corridors to isolate urban areas from noise and pollution as the Army Canal axis • Dividing the area of the river into five secondary areas, ranging between recreational and functional
5	The comprehensive urban development project	Working team from the Mayoralty of Baghdad and professors from University of Baghdad	1998	17 m ²	<ul style="list-style-type: none"> • Studying historical and archaeological sites for their development and investment in tourism and the exploitation of their open spaces within the network of green spaces in the city • Stop cases of encroachment on green areas • Adopting a connection method using tapes connected to green areas and protected parks extending through all residential and working areas • Dividing the Tigris belt region into secondary regions, ranging between fully rural and very urban • Increasing the planning standards of green areas through the development of new parks, especially in areas with high population densities • Proposing the establishment of green areas within the outer belt, in which it is not permissible to build, consisting of farms and forests, around the proposed city boundaries • Dealing with the natural and urban environments as they interact to produce the city's identity, and the quality of life enjoyed by the city's population is mainly defined • Preventing the conversion of the gender of agricultural land use to any other urban use and the direct cultivation of it, and stopping the random urban expansion on it
6	Baghdad Comprehensive City Development Plan 2030	The Lebanese Office Of Al-Khatib And Alami	2007	–	<ul style="list-style-type: none"> • Attention to the Tigris River and its banks and the mechanisms of dealing with them • Establishing a protective and limiting green belt for urban expansion • Establishing new growth centres in order to accommodate the expected population increase for the city of Baghdad • Preserving agricultural orchards and palm orchards within the boundaries of the Mayoralty • Preserving the hierarchy of green areas in a more integrated and interconnected form for the city • Working to increase green areas within the city and based on the hierarchy of green areas • Transferring heavy industries and some light industries harmful to the city's environment to the new areas and industrial contracts proposed within the draft development plan • Proposing a set of transportation solutions in order to reduce the use of cars and the adoption of public transportation to reduce environmental pollution, noise and the negative effects of cars on the city

Source: The researcher (2022).

Despite all these priorities and main points emphasized by these masterplans, what has been implemented of them is not comparable to the population increase of the city of Baghdad, nor to the increase in urban sprawl on its green and open areas, because of the shortcomings of the legislation and laws that guarantee the preservation of green areas, the weakness of oversight in the concerned departments, the lack of environmental awareness among citizens, and the transgression of land uses designated as green areas, which certainly led to an increase in the city's pollution and the loss of many of the ecological aspects of the city, which affected Turn on the nature of life within the city of Baghdad.

CONCLUSIONS

The research aimed to study and analyse the green areas of the city of Baghdad, and the most important proposed scenarios in the previous comprehensive development plans for the city of Baghdad, which came

to increase the percentage of green areas within the city, the main points can be summarized as follows:

1. The green areas in the city of Baghdad did not develop in accordance with a prior plan that was proportionate to the size of the population on the one hand and the size of the city on the other, but rather they developed as a result of random decisions, relying on portions of some development plans while ignoring others, as well as the disappearance and removal of many of these areas, particularly the orchards and the green belt area, as a result of the expansion of the city.
2. The urban environment of the city of Baghdad has been developed using a number of comprehensive development plans and designs. There were plenty of them in the open lands and green areas. These plans' most significant considerations in relation to green spaces are:
 - a. It turns out that the previous Baghdad masterplans put a significant focus on green areas, their growth, and preservation because of all

Table 5. The Strength Points of the Baghdad's Masterplans

No.	Baghdad's Masterplans	Dealing with the population increase	Dealing with the Tigris River and its banks	Preserving orchards as green areas within the city of Baghdad	Establish a protective green belt for the city of Baghdad	Dealing with roadsides and turning them into green areas	Deal with the hierarchy of green areas within the city	Surround the industrial areas with a belt of green areas	Transferring heavy industries and some light industries	Proposing a set of transportation solutions
1	Master Plan for Minobrio & Associates		●		○		○			
2	Doxiadis Associates Master Plan			●			○			
3	Comprehensive Development Plan for Law 156	●	●			○	○	●		
4	Integrated Development Plan JCCF	●	●			○	○			
5	The Comprehensive Urban Development Project	●	●	●	○					
6	Baghdad City Comprehensive Development Plan 2030	●	●	●	○	○	○		●	●

Source: The researcher (2022).

the benefits they provide in terms of climatic, ecological, aesthetic, recreational, social, and economic aspects. Additionally, there are a number of priorities and key ideas that all previous masterplans for the city of Baghdad share, all of which aim to enhance and improve the city's ecological and environmental conditions. These include:

- Dealing with the population expansion and urban sprawl on green areas is necessary because it is one of the main causes of the city's loss of ecological aspects and rise in pollution levels, which was evident in Baghdadi daily life.
- Taking care of the Tigris River and its banks requires first dividing it up into a number of places and putting the emphasis on converting them into green areas, particularly in the northern and southern parts of the Tigris River.
- preserving orchards as green spaces within Baghdad's city limits and preventing encroachment on them due to their significant contribution to the improvement of the city's ecological and environmental condition.
- The majority of the masterplans emphasized the importance of creating a protective green belt for the city of Baghdad, with the potential to use it as open green spaces for relaxation and recreation.
- The most of masterplans placed a strong emphasis on managing the main axes of transportation and the importance of reforestation on the sides and median islands to improve the city's ecological aspect.
- The requirement to address the hierarchy of green spaces in the city.
- To lessen the amount of environmental pollutants created by industrial regions and other polluting activities, a belt of orchards and green spaces must surround these locations.

Despite all of the priorities and key points emphasized by these masterplans, their implementation has not been on par with the growth in the city of Bagh-

dad's population or the expansion of the city's open spaces due to the inadequacies of the legislation and laws that guarantee the preservation of green spaces, the lack of adequate oversight in the relevant departments, the lack of environmental awareness among the general public, and the transgression of these masterplans.

It unquestionably contributed to a growth in the city's pollution and the loss of many of the ecological aspects of the city, which had an impact on Turn on the way of life in the city of Baghdad.

The Baghdad Comprehensive City Development Plan 2030 (Khatib and Alami) did not include a standard for green spaces, making it challenging to evaluate its principles absent actual figures representing standards that go along with the plans that are put into practice on the ground to realize the vision, ideas, and principles it presented. What was actually done, however, was to carry out field surveys of the current situation and anticipated outcomes for the target year, as well as research comparing the current standards in Arab and other international countries to the standard set by the World Health Organization.

- a. The Baghdad Comprehensive City Development Plan 2030 was created to address the city's issues by focusing on a variety of scenarios, particularly those that dealt with the city's ecological and environmental issues.
- b. However, the following drawbacks are listed on the comprehensive development plan with regard to the city's environmental and ecological aspects, particularly at this time, which is more than 7 years after the completion of the fourth phase:
 - The percentage of green and open areas one per person and how they are dispersed throughout the city were not clearly stated in the plan.
 - The plan confirmed the assimilation of the population within the master plan and in neighbouring cities within a 30-kilometer radius of the city centre, but the methodology changed to increase the horizontal expansion of the current plan and absorb the excess population in the newly expanded areas horizontally, which is one of the negative things

(horizontal expansion) due to the increase in costs. Foundation structures and consumption of agricultural land and green/open areas were also two negative things (horizontal expansion).

- The adoption of the plan on the reality of the city of Baghdad for the years 2010–2011 to analyse land uses and offer suggestions makes it impractical at the moment in many of its paragraphs and recommendations due to the significant change that has taken place throughout the city and the change in the proportions of different land uses.
- A risk assessment, potential outcomes, and challenges associated with implementing each of the suggested scenarios, as well as the specialization of green areas and the rise in their percentage inside the city of Baghdad, were not made clear in the plan.
- The proposed spaces to enhance green areas' percentage within the city were not given a clear weight in the plan.

The creation of a green belt around the city of Baghdad, as well as the preservation of orchards and agricultural areas inside the city limits, were prioritized in the majority of comprehensive development plans due to their significant contribution to the preservation of the city's ecological and environmental features.

In addition to all of this, Baghdad Comprehensive City Development Plan 2030 (Khatib and Alami) included recommendations that would improve the environment and ecological aspects. These included moving some industrial areas outside the current city limits and implementing sustainable transportation and activation strategies within Baghdad.

RECOMMENDATIONS

The research recommends a set of points, which are:

1. The need to preserve the green areas within the city of Baghdad by the concerned authorities.
2. Work to develop and increase the percentage of green spaces per person to get closer to the international standard.

3. The need to work on proposing development scenarios for green areas and to adopt the current reality of the city of Baghdad in proposing these scenarios.
 4. Work on developing the banks of the Tigris River within the city center of Baghdad for its role in increasing the environmental aspects of the city.
 5. The need to surround the city of Baghdad with a protective green belt due to its necessity in providing protection for the city from environmental influences and improving the environmental and ecological aspects of the city of Baghdad.
- policy implications

“Our research shows the possibilities available to the city of Baghdad to increase its green areas, according to the development scenarios proposed in the comprehensive development plans, which brings positive aspects to the city's environment”. The statement indicates that the government should devote more attention to green areas and their preservation, but does not recommend any specific actions.

RESEARCH LIMITATIONS

1. Difficulty obtaining drafts of previous comprehensive development plans for the city of Baghdad.
2. Difficulty obtaining realistic Baghdad city plans for previous years.
3. Lack of previous research in the field.
4. As for time constraints, the city of Baghdad is witnessing a large and rapid expansion, and the solutions proposed by the master plans may not be useful after 10 years.

RESEARCH PROSPECTIVE

In this article, we explore the idea of “the reality of green spaces in Baghdad” and the possibilities that the city of Baghdad contains in order to increase the environmental aspects by increasing the percentage of green areas according to the scenarios that came from the previous comprehensive development plans for the city.

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