

DEVELOPING AND INCREASING "OPEN SPACES" BY USING "SMART GROWTH APPROACH" APPLIED TO "ZAGAZIG CITY – EGYPT"

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ABSTRACT

In the early 1990s, 32 U.S. Civil Society Organizations formed a broad coalition known as (Smart Growth Network) to solve urban problems and develop neighborhoods to make them healthy, vibrant and diverse neighborhoods that offer their people how and where to live. The Smart Growth Approach consists of ten principles the sixth of which is concerned with "preserving open space and natural beauty". Open spaces are the main lungs of any city because they serve as its natural outlet. However, for the Egyptian context, open spaces do not suit the needs of the population. This paper aims to develop and increase open spaces through the study, analysis and comparisons of some experiments that used the sixth principle to conclude certain elements that would increase and develop open spaces, with the application of these experiments' results on Zagazig City as a model of Egyptian cities to benefit from this research.

KEYWORDS: Smart growth, open spaces, increased spaces, developing spaces, existing cities, and modern urban planning approach.

1. INTRODUCTION

The Smart Growth Approach aims to reduce horizontal urbanization and maintain open spaces. It consists of ten principles; the sixth principle is "Preserve open space, farmland, and natural beauty". In the context of urban planning development, urban expansion, congestion in cities and the spread of cement forests, the element of open spaces is reduced at the expense of buildings and constructions which is considered a big problem. Therefore, in urban planning or re-planning, open

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spaces and green areas linked by an integrated system must be considered to meet the needs of the population and solve this problem.

2. METHODOLOGY

The methodology of this paper is based on the development and increase of open spaces in existing Egyptian cities. This paper is, therefore, divided into four sections; the first section is called “Theoretical” discussing open spaces and Smart Growth. The second section “Descriptive” deals with the study of Smart Growth experiments that are interested in open spaces. The third section is “Comparative analysis” of the experiments to extract the elements that work on open space development and growth. The fourth is “Application” which benefits from these results and applies them to the model of the Egyptian city as shown in Fig. 1.

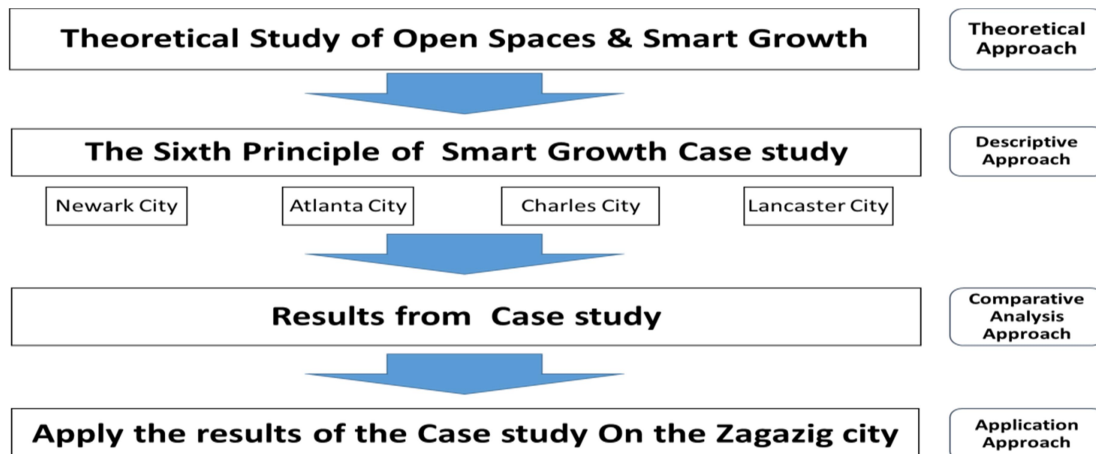


Fig. 1. Research structure flowchart.

3. RESEARCH SCOPE AND PURPOSE

The paper’s main objective is to develop and increase the percentage of open spaces in the Egyptian cities by increasing open space per capita rates and review some of the experiences that focus on achieving the Sixth Principle of Smart Growth to learn from these experiences and then apply these lessons in the city of Zagazig in Sharkia Governorate, Egypt.

4. SMART GROWTH

4.1 Smart Growth Definition

U.S. Environmental Protection Agency (EPA) defines the Smart Growth as “it consists of strategies for the development and maintenance of the society, the protection of the natural environment, economic strengthening and social preservation by planning and designing residential buildings along with service buildings (i.e., commercial - educational - religious - health - gardens) that are accessible by walking, cycling, public transportation, and involve people in the decision-making process. These communities create vibrant places for living, working, playing and high quality of life” [1-2].

4.2 Principles of Smart Growth

The U.S. Environmental Protection Agency is one of the most important institutions that support Smart Growth and is responsible for implementing environmental laws [3].

Ten principles of Smart Growth have been chosen to ensure the protection of human health and the environment and to minimize the environmental impact of cleaning activities. When considering these principles; programs will ensure compliance with EPA cleaning programs laws and regulations without prejudice to the interests of society, these principles are:

(Mix land uses - Take advantage of compact building design - Housing opportunities and choices - Create walkable neighborhoods - Attractive communities with a strong sense of place - Preserve open space and natural beauty - Strengthen and direct development towards existing communities - Transportation choices - Make development decisions predictable, Fair and cost-effective - Encourage community and stakeholder collaboration in development decisions) [4-6].

4.3 Pros and Cons of Smart Growth

Smart Growth, like many things with pros and cons, reduced habitat fragmentation due to urban sprawl, reduced carbon emissions from automobiles,

reduced consumption of wasteful natural resources and fossil fuels depletion, reduced pollution such as runoff from lawn fertilizers and pesticides, saved money through the use of ecological services, lowered housing and transportation budgets, increased competition due to proximity and provided more job opportunities in the market. Green buildings save energy and thus save huge amounts of money, greater social capital as people are closer to each other in communities, better health, and with closer proximity, local governments become stronger.

The Smart Growth defects are: land must be designated for planning, so habitat destruction is inevitable. Without adequate funding, Smart Growth is not affordable, as the government will need to find a way to pay people for their private property, loss of property rights by abandoning private property for public use, and as a result of close living quarters, crime rates may increase [7].

4.4 Principle 6 of Smart Growth (Preserve Open Space, and Natural Beauty)

Open space can be used for many purposes such as wetlands, plant growth areas, green spaces, animal homeland, and production grounds. Furthermore, open space can be seen as a distribution of life quality experience and community natural beauty.

Nations should consider open spaces worthy of protection, such as parks and recreation areas which have a vital role to play in supporting the Smart Growth [4].

Open spaces are a comprehensive concept that includes natural areas, green areas, farmland, natural beauty sites, and critical areas of the environment (e.g., wetlands). Preserving open spaces supports Smart Growth's goals through improving the community's quality, environmental quality, and health benefits and works to guide the communities' new growth. Open spaces have the advantages of purifying harmful air, controlling wind and reducing noise [8].

For the sake of future development, the owners of these lands lose much of their profits. Governments are primarily responsible for planning and implementing Smart Growth and can and should play a role in supporting and facilitating

community reform efforts. Budget problems and shortfalls are likely to be the single most significant obstacle to further planning reforms [9].

5. OPEN SPACES

5.1 Benefits and Importance of Open Spaces

Open space is defined as an open area that offers many benefits; cultural, social, economic and environmental which contribute positively to physical and mental health and improve quality of life. It serves all social categories of society and is accessible and sport-friendly [10].

The advantages of urban open space can be divided into three main forms: entertainment value, (using open spaces for celebrations, festivals, and events.... etc.), environment value, (providing green elements purifying the air) and the Aesthetic value (adding Soft artificial landscapes or Hard landscape). To indicate that "green" alone is not enough; the quality of this green color is also important [11].

As far as health is concerned, open spaces are the “lungs” with which cities breathe and increasing open space areas means a healthy human environment. They play a key role in the beautification of cities including the aesthetic views, such as fountains, ponds, arches, and others. They also embellish the surrounding sites and attract attention, in order to strongly link man with his surroundings. Man needs a place to calm down, to reassure his feelings and senses, and to rest with his beauty that compensates him for the trouble and hardship of his work [12].

5.2 Reasons for Open Space Shortage

There are several reasons for the shortage of open spaces which include the following:

- Absence of comprehensive thinking of planning strategies for open spaces at the national, regional and local levels.
- Lack of a comprehensive concept of green and open spaces network, resulting in a poor distribution of their site selection thus becoming unlinked.
- Lack of financial resources to provide and maintain green and open spaces.

- Increased population, suburban sprawl, construction densities, and high value of land real estate led to their non-exploitation as open spaces.
- Neglect and deterioration of the few open spaces that exist without periodic maintenance.
- Lack of environmental awareness among visitors and open space users [10].

5.3 Planning Criteria for Open Spaces in Existing Cities

Conditions, that define the number of open spaces in cities, vary from location to another. Natural conditions as rain, surface water-groundwater, and nature of soil and climate, and physical, social, economic development conditions of the population, make it difficult to determine open spaces rates or their general measurements in cities. On the other hand, there are basic considerations in the planning of these areas, namely:

- An appropriate number of open spaces compared to the population.
- Appropriate locations of open spaces according to use purposes.
- Take advantage of land topography and preserve nature.
- Provision of recreational elements in parks and open spaces [13].

5.3.1 Per-capita from the world's open spaces

- In the 1960s, the Simons Chart determines an average of 18 m^2 per person, and Paul Reiter defines 10 m^2 of recreational green spaces per capita [14].
- In the 1990s, the United Nations Environment Program (UNEP) and the European Union (EU) identified a minimum of $(12-16) \text{ m}^2$ per capita [15].

5.3.2 Open spaces per capita & the share of open spaces in Egyptian cities

Per capita rates of open spaces in the existing Egyptian cities is $(0.5 - 1.5) \text{ m}^2$ / person. According to the rates and standards of the National Authority for Civilization Coordination, a ratio of $(7-10) \text{ m}^2$ / person is required. In the new Egyptian cities per capita, open space rates are $(7-13) \text{ m}^2$ / person and according to the rates and standards

of the National Authority for Civilization Coordination, it requires a ratio of (15-20) m² / person [11].

It is a simple and understandable indicator, but its drawback is that it can be misleading. In the case of high population density or construction or high building elevations, the minimum is usually between (10 - 20%) of the total area from the city. The ratio, in Germany, is between 40% - 50% of most German cities [13].

6. CASE STUDIES THAT APPLIED THE SIXTH PRINCIPLES OF SMART GROWTH

The U.S. Environmental Protection Agency (EPA) is one of the largest agencies participating in the Smart Growth Program in the United States of America. It has been awarded yearly prizes for the best cities that apply the Smart Growth Principles (National Award for Smart Growth). The EPA has discussed the experiments related to the Sixth Principle of Smart Growth and this paper discusses "the preservation of open spaces, green areas, and natural beauty", taking into consideration to show all data of images for each case study. A problem arose before and after accessing the maps of these sites but managed to replace them with photo images as much as possible. These experiences are as follows:

6.1 Riverfront Park, Plazas, Parks, and Public Spaces in Newark City, New Jersey, USA

Newark City is located in New Jersey, USA, 8 kilometers west of Manhattan and 3 kilometers north of Staten Island and is considered New Jersey's largest city. In 2015, Newark's Riverfront Park, plazas, parks, and public spaces were awarded the "National Smart Growth Award" by applying the sixth Smart Growth principle. [16].

Riverfront Park is a site that has been constantly changing for decades. In the past, it was a melting point for metals and was transformed into a park that has become an integral part of the community's identity and activities in terms of hosting events and festivals and giving people the opportunity to walk, cycle, relax and play, as well as recovering the Passaic Riverfront in Newark. In this project, a partnership

was formed between the U.S. Army Corps of Engineers, local populations and New Jersey's Environmental Protection Department as shown in Fig. 2.



Fig. 2. Riverfront Park before and after transformation.

In addition, Newark offers many benefits including open spaces to help people live a healthier life, improve air, water, quality, improve the social and economic situation, and exploit unused land and transform it into green and open spaces. 19 acres of parks have been added to the city, as well as spaces and walks along the river up to about 5 miles [17].

Ultimately, it makes Newark a lovely place to play games, relax and walk, and keep an open space along the river that can protect people from flooding. It is also evident that Newark city has used several principles to increase the proportion of green and open spaces which can be summarized as follows:

- Transformation of unwanted utilizations (Iron and Steel Industrial Zone) into open spaces (Riverfront Park).
- Exploitation and transformation of some unused land into city green and open spaces, pedestrian trails, and bicycle paths next to the Passaic River [17].

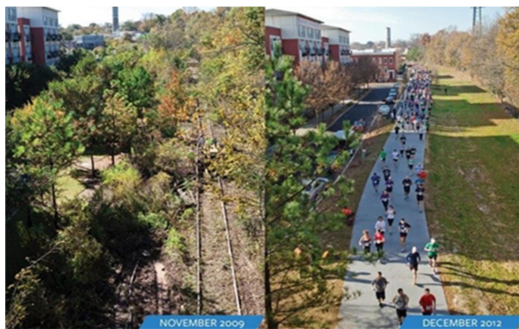
6.2 Atlanta Beltline Eastside Trail and Old Fourth Ward Park in Atlanta City, Georgia State, USA

Atlanta is the capital of Georgia State and the largest city in terms of population, and it is a global city due to its great impact on trade, finance, research, technology, education, media, art, and entertainment. In 2013, Atlanta won the

“Excellence Award” of the National Award for Smart Growth Achievement, for the application of all Smart Growth Principles, the most important of which is the Sixth Principle.

The Atlanta Beltline Eastside is made up of four railways built in the late 19th and early 20th centuries in the City Centre. Railway corridors surrounded the city’s original industrial area, but when the industrial zone was shut down, and railway lines were cancelled, the beltline areas became contaminated and abandoned.

An area of 22 miles of railway corridors, mostly abandoned as multi-purpose tracks, has been redeveloped and transformed into 1300 acres of green space, thousands of affordable homes and billions of dollars leading to high economic growth. The Old Fourth Ward Park was the industrial waste dump where it was cleaned and is now a beautiful garden with local plants. Atlanta Beltline and Fourth Ward Park are now accessible via multi-purpose roads offering entertainment and landscaping where neighbors meet together for socializing, shopping and entertaining as shown in Fig. 3.



Atlanta Beltline Eastside Trail



Historic Fourth Ward Park

Fig. 3. Atlanta Beltline Eastside Trail and Historic Fourth Ward Park before and after the transformation.

The project was launched in 2008, and a partnership was established between local municipalities, federal agencies, community members, companies, community groups, foundations and non-profit organizations to restore the area [18].

In Atlanta, several principles have been used to increase the percentage of green and open spaces and summarized as follows:

- The exploitation of old railway lines as multi-purpose paths, green and open spaces, walking and running and exercise trails.
- Transformation of old industrial areas into green and open spaces and residential areas.
- Conversion of industrial drainage ponds to green and open spaces [18].

6.3 Riverfront Park – Charles City, Iowa State, USA

Charles City located in Iowa, United States, with a total area of 16.34 km², with the Cedar River in the middle. In 2013, Charles Riverfront Park received the National Smart Growth Award by applying the Smart Growth Sixth Principle [19].

Cedar River flooded some of the lands with water, and the Federal Emergency Management Agency (FEMA) exploited this area and created the vibrant “Riverfront Park” through Charles City. Taking advantage of the river’s natural features, Charles River has been transformed from an environmental obstacle into a green area where people like to go. Along the river, there are plenty of green and open spaces, places to play river games, fishing, a fountain in the middle of the river and kayaking as shown in Fig. 4 [18].



Fig. 4. Transformation of the land of the River into open and green spaces in Riverfront Park.

Charles City used the Smart Growth Approach to increase the percentage of open and green spaces and summarized as follows:

- The exploitation of submerged areas (lands of the river) to increase open and green spaces.
- The exploitation of the tracks adjacent to the river for fishing and practising water sports [18].

6.4 Envision Lancaster County Comprehensive Plan – Lancaster City, Pennsylvania State, USA

Lancaster City is located in Lancaster County, Pennsylvania State; the U.S.A, its population was 59322 in 2010 according to the United States Census Bureau. Lancaster received the “General Excellence Award” of the 2009 National Smart Growth Award, for applying all the ten Smart Growth Principles.

Like many rural areas, Lancaster County has been under pressure to develop its vast agricultural land and open space. The Lancaster County Planning Commission has, therefore, developed a comprehensive district-level plan for managing growth and maintaining a place over the next 25 years, as shown in Fig. 5.



Fig. 5. Preserve what is already in place and protect it from switching to other uses.

A plan has been put in place to protect agricultural land, rural areas and landscapes by encouraging reinvestment in existing societies, preserving open spaces, and providing greater housing and transportation options by applying all Smart Growth principles [20].

The city of Lancaster has used Smart Growth principles to increase the percentage of green and open spaces, and summarized as follows:

- Preserve what is already in place and protect it from switching to other uses.
- Improve and increase the efficiency of green and open spaces to expand the base of beneficiaries [20].

7. COMPILING AND COMPARING THE RESULTS OF CASE STUDIES TO DEVELOP AND INCREASE OPEN SPACES

The results of the previous case studies are collected and compared to serve as solutions for any city in order to develop and expand open spaces. The following Table 1 shows the results and statements as follows:

Table 1. Compiling and comparing the results of case studies.

Case Studies Name	Results of Case Studies
Riverfront Park, Plazas, Parks, and Public Spaces in Newark City	<ul style="list-style-type: none"> • Transform unwanted utilizations (Iron and Steel Industrial Zone) into open spaces (Riverfront Park). • Exploit some unused lands and transform them into city green and open spaces, pedestrian trails, and bicycle tracks next to the Passaic River
Atlanta Beltline Eastside Trail and Historic Fourth Ward Park	<ul style="list-style-type: none"> • Exploit old railway lines as multi-purpose tracks, green and open spaces, walking, running and exercise trails. • Transform old industrial areas into green and open spaces and residential areas. • Convert industrial drainage ponds to green and open spaces
Riverfront Park – Charles City	<ul style="list-style-type: none"> • Exploit submerged areas (lands of the river) to increase open & green spaces. • Exploit the tracks adjacent to the river for fishing, and practising water sports.
Envision Lancaster County Comprehensive Plan	<ul style="list-style-type: none"> • Preserve what is already in place and protect it from switching to other uses. • Improve and increase the efficiency of green and open spaces to expand the base of beneficiaries.

From the previous table of Compilation and Comparison of the results of previous open space development and expansion case studies, it is obvious that there

are several solutions to the problem of open space shortage in cities. These solutions can be concluded as general recommendations for increasing and developing open spaces in cities, which are as follows:

- Preserving open spaces.
- Exploiting large and unexploited land.
- Transforming undesirable uses.
- Exploiting water bodies.
- Exploiting the vicinity of the water bodies (i.e., areas of the river).

8. THE APPLIED EXAMPLE OF SOLUTION TO DEVELOP AND INCREASE OPEN SPACES (ZAGAZIG CITY)

8.1 Zagazig City

Zagazig is the capital of Sharkia Governorate. It is situated in the eastern part of the Nile Delta, on Moisi Canal or (Moisi Sea), and about 80 km northeast of Cairo. Zagazig is an important city at the crossroads between Cairo, Canal Cities (Ismailia - Port Said – Suez), Damietta, Mitt Ghamr, and Mansoura as shown in Fig. 6. The total area of urban boundary of Zagazig is 4275 acres, with a population of 481500 in the year 2027 [21].

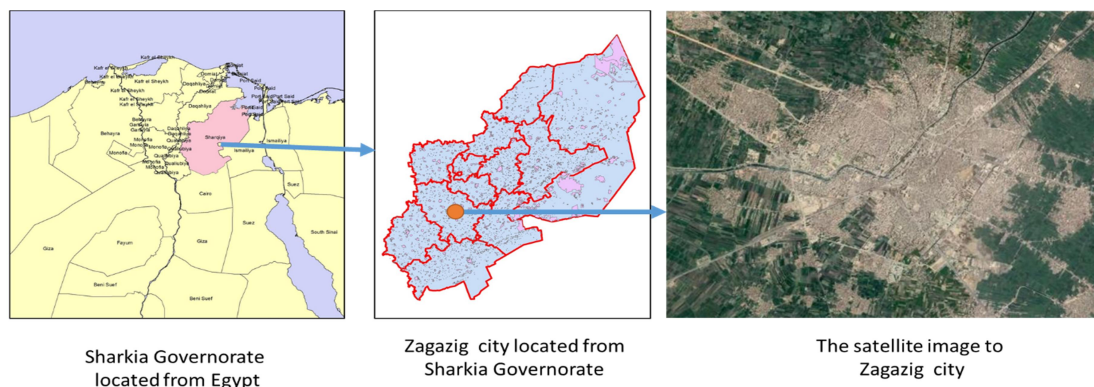


Fig. 6. The regional entrance to Zagazig City.

8.2 Land Use in Zagazig City

Zagazig city, like other Egyptian cities that lack green and open spaces, has an area of about 4275 acres, while the area of open spaces is about 221.18 acres, [21] as shown in Fig. 7.

Distributed as follows (Water bodies 48.63 acres - Recreational uses 11 acres - Sports uses 28.5 acres - Squares and Fields 8.61 acres - Main Recreational Axis 106.76 acres –Garden Houses 17.66 acres) [22]. Zagazig city's percentage of open spaces is about 5.1% of the city's total area, which means that open spaces per capita are 1.92 m^2 , which is unacceptable and needs to be developed and increased.

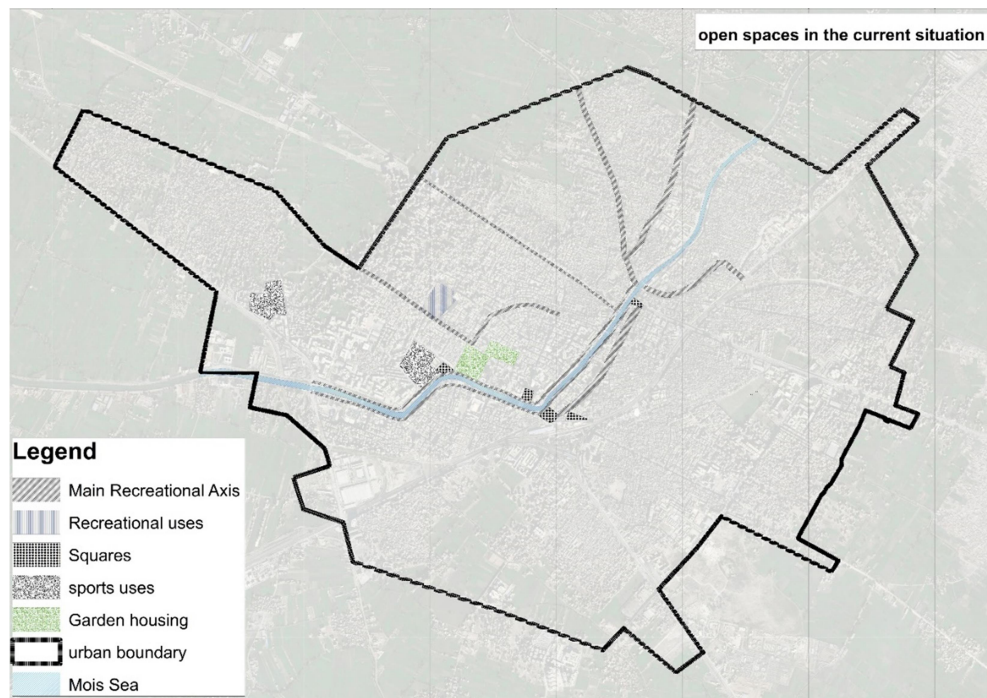


Fig. 7. Current open spaces in Zagazig City.

8.3 Solutions Applied According to Similar Case Studies to Develop and Increase Open Spaces

In Zagazig city, there are many elements that allow us to increase open spaces and referring to the previous strategies, the following is illustrated:

8.3.1 Transformation of undesirable uses

As shown in Fig. 8, Zagazig city has many unwanted utilities that do not fit with the use of the city's residential areas and services which can be redesigned and converted to green and open spaces such as:

- The Central Prison with an area of 2.2 acres (transferred for security purposes to desert areas).
- The Protex Factory with an area of 34.23 acres (Factory has been in suspension since 2000).
- The Soap Factory with an area of 12.35 acres (Factory will be relocated to 10th of Ramadan City, Sharkia Governorate).
- Silos warehouses with an area of 19 acres (Storage has been stopped since 1990).



Fig. 8. Unwanted utilities in Zagazig City.

8.3.2 Exploitation of large untapped open spaces

There are many untapped areas, land spaces; agricultural cleaves within the urban block and many agricultural areas in the outskirts of the urban boundaries as shown in Fig. 9, which can be exploited as follows:

- Housing projects applying the Smart Growth Approach (i.e., housing + services + green and open spaces).
- Garden housing projects.
- Establishing a city-level public park.

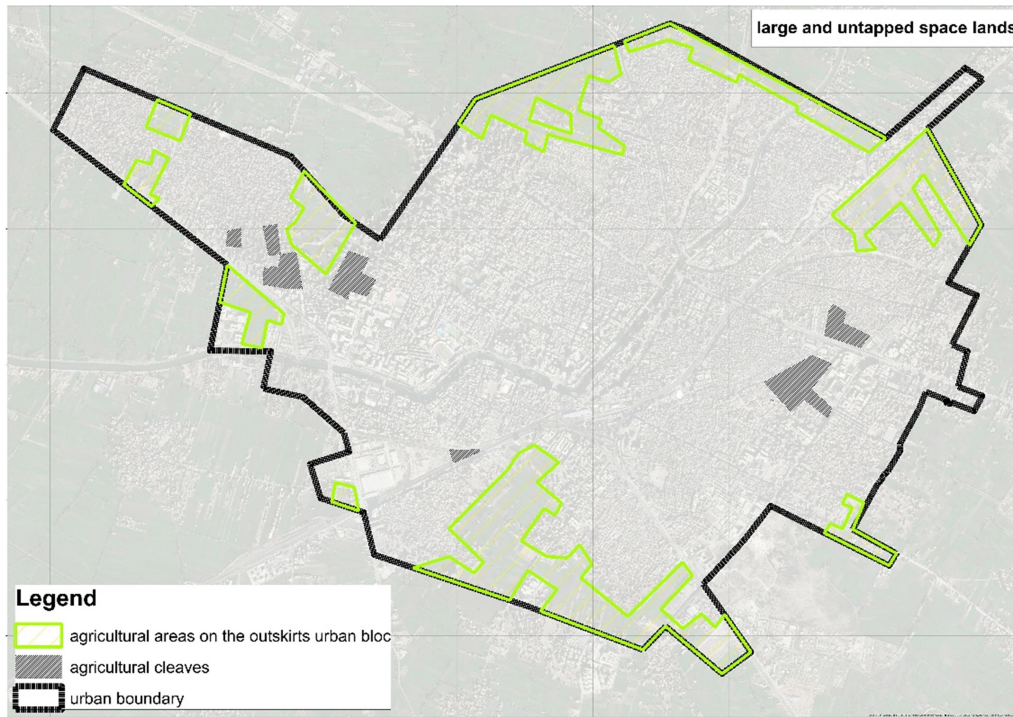


Fig. 9. Large untapped open spaces in Zagazig City.

8.3.3 Conservation of green and open spaces within cities

Preserve and protect the existing green and open spaces from switching to other uses and develop and improve their quality through:-

- Planting seasonal green trees to provide sun and light during winter and selecting plants that do not require continuous care.
- Providing playgrounds with fun games and adequate seats.
- Necessary facilities and services should be available such as toilets, a simple cafeteria, and garbage bins.

Examples are as the Public Parks in Elganayen Street, the Egyptian plaza, the garden housing and sports and recreational utilities.

8.3.4 Exploitation of water bodies

Developing the waterfront of the (Mois sea), and exploiting the sea vicinity (the estuaries) to increase green areas and open spaces by:-

- Turning the sea estuaries into paths and tracks to practice water sports.
- Providing gardens overlooking water bodies with boats and anchorage ships.
- The canal is located within the urban block and is one of the obtainable ways to increase recreational spaces in most cities.

9. CONCLUSIONS

In order to develop and increase the percentage and per capita of open spaces and green areas in cities, the following principles should be followed:

- Transfer unwanted urban utilities to the outskirts of the city such as (prisons, industrial zones, warehouses, old railway lines, and drainage basins), and convert these areas to open spaces, gardens, parks and housing projects with Smart Growth Approach.
- Preserve open spaces by developing and improving them such as (public gardens - garden housing – sports and recreational facilities).
- Take advantage of large and untapped land within and around the city's urban boundaries through Smart Growth housing projects, garden housing projects, and city-level public gardening.
- Exploit and develop water bodies by improving its quality and take advantage of the adjacent areas (i.e., areas behind sea).

Implementing these principles on Zagazig city will increase the area of open spaces from 221.18 acres to 929 acres to become 22% which is a more acceptable percentage than it used to be.

For the idea of the Smart Growth approach, some future directions were suggested to increase city open spaces by the following:-

- Apply modern planning ideas using modern technology, such as the green buildings that are environmentally-friendly buildings. Besides being highly efficient in the use of resources during their entire life cycle.

- Work to transform cities into a green network that allows people to walk or ride bicycles to have access to all the city's main roads.
- Establish legislative laws to organize open spaces in the city through developing guidelines and minimum standards special for open spaces, landscapes, and existing cities urbanization.

CONFLICT OF INTERESTS

The authors have declared no conflict of interests.

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تطوير وتنمية المناطق المفتوحة باستخدام النمو الذكي بالتطبيق على مدينة الزقازيق - مصر

يهدف البحث إلى تطوير وزيادة المساحات المفتوحة من خلال دراسة وتحليل ومقارنات بعض التجارب التي استخدمت المبدأ السادس من العشرة مبادئ التي نص عليها منهج النمو الذكي (الذي قدمه ٣٢ منظمه من منظمات المجتمع المدني بالولايات المتحدة)، وذلك لإستكمال بعض العناصر التي تعمل على زيادة وتطور المساحات المفتوحة، مع تطبيق نتائج التجارب على مدينة الزقازيق كنموذج من المدن المصرية للاستفادة من البحث.