

STUDIES ON GREEN AREAS IN MANSOURA CITY

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ABSTRACT

Studying green areas in Mansoura city as a model of Egyptian cities has become a very important issue. Therefore, the purpose of this study is to identify the green areas in the city of Mansoura and its adequacy range of quantity and quality and propose appropriate solutions. We have studied the green areas in the city as following: the total area of the public green areas, the rates of green areas in the city (the per capita green area in the city in 1949, 1977, 2007 and 2012- the international norms of green spaces), the distribution of green areas, the last green area changes in Mansoura city from 2007 to 2013(Lost green areas – Al Geash st developments - Shagret El-dorr garden) the types of green areas in the city, the maintenance (the available gardening tools in East and West district of Mansoura city in (2010) - The Green areas expenses during fiscal year (2009/2010) in Mansoura city) and street trees (a field survey for street trees in 22 of Mansoura city main and secondary streets). We have found that the status of green spaces in the city is very poor for a lot of things, the per capita green area is 0.4055 m² in 2012 from 0.50 m² in 2007 due to the increasing population and the decreasing of the total green areas, the distribution (the green areas of the city didn't make a network permeating the body of the city - no connection between its units - its small areas did not allow doing many activities...), maintenance (a shortage in tools necessary for maintenance – the total expenses on green areas during fiscal year (2009/2010) in Mansoura city was about 0.4172 EGP/m²), street trees (the rule of a one type of trees *Ficus retusa* - ...). To improve the green areas in Mansoura city we have proposed: steps are now available, developments of a short-term plan, development of a long-term plan and adding green areas.

INTRODUCTION

With Most of the world's population now living in cities and towns, unhealthy, sedentary and stressful lifestyles have become more common. Green spaces and nature can provide part of the solution (Konijnendijk, 2009). Urban areas in 2000 covered about 4% of global land area (United Nations Development Programme *et al.*, 2000) with continued growth predicted that the population of urban areas is expected to exceed 60% by 2030 (United Nations Environment Programme, 2005). This growth is primarily a consequence of a combination of human population increase,

development, and social trends, with the relative importance of these factors varying between regions (Davies *et al.*, 2008)

The quality of urban environments has increasingly been regarded as an important issue. In particular, the extent, composition and access to green spaces within urban areas have been shown to have significant impacts on the quality of life of urban populations (Davies *et al.*, 2008). First, evidence is gathering in support of benefits for human physical and mental well-being (CABE space, 2004; Dunnett and Quasim, 2000; Galea *et al.*, 2005; Takano *et al.*, 2002; Ulrich, 1984). Second, benefits are evident through a diverse array of economic impacts, including those on house prices, the costs of heating and cooling buildings, and the ease of attracting businesses and employees to areas e.g. (Bolitzer and Netusil, 2000; CABE space, 2004; Luttik, 2000; Morancho, 2003). Third, the extent and quality of urban green space has been shown to have important influences on the provision of ecosystem services (e.g. clean air and water, climate regulation), ecosystem resilience and biodiversity e.g.(Bolund and Hunhammar, 1999; Colding, 2007; Er *et al.*, 2005; J. Gaston *et al.*, 2005; Kühn and Klotz, 2006; Pauleit and Duhme, 2000). The size of green areas per inhabitant became a measure of the quality of life and human health.

Mansoura city is the eighth largest city in Egypt in population number and the most populated city in Delta (Wikipedia.org, 2013). It is known by its very high population density, crowded transportation especially in Rush hours, a little polluted air and less gardens and open areas. The city of Mansoura is the capital of Delta cities because of its educational, therapeutic, commercial, sport, and tourism importance. So studying green areas in Mansoura city as a model of Egyptian cities has become a very important issue. Therefore, the purpose of this study is to identify the green areas in the city of Mansoura and its adequacy range of quantity and quality and propose appropriate solutions.

MATERIALS AND METHODS

This research was conducted in the period from 2008 to 2013 to study public green areas in Mansoura city. As in all landscape projects we must make a Location Analysis so in this research we made a location analysis according to Sharaf-El-Den (1979).

1- The total area of green areas

2- The rates of green areas in Mansoura city:-

The factors that are taken into account when assessing and calculating green spaces.

The per capita green area in Mansoura city.

International Norms for Urban Green Spaces - International minimum standard.

3- Distribution of green areas in Mansoura city

4- Green areas changes in Mansoura City from 2007 to 2013

Lost green areas.

AlGeash st developments.

Situation of Shagret El-dorr garden.

5- Types of green areas in Mansoura city.

6- Maintenance of green areas in Mansoura city.

The Available gardening tools in East and West district of Mansoura city in 2010.

The Green areas expenses during fiscal year (2009/2010) in Mansoura city.

7- Street trees in Mansoura city.

We have made a street survey in 22 of Mansoura city main and secondary streets by using Mansoura city satellite map 2004* as following:

- Adobe Photoshop CS3 program has been used to divide this map to pieces 20.5 x 29.0 cm then excluding all pieces that is out the boundary of the city, then printing all the remaining pieces at the top right corner of A4 paper (A4 paper size 21.0 x 29.7cm). Afterwards gluing the papers in rows (about 12 rows), then folding every row continually like w letter, so in the end we had the entire map (more than 100 paper) in hand like a book.
- We have made that survey by pointing out roadside trees in the streets under study and also we have pointed street median's trees in Saad Zaghloul St, Kanat Al Sweis St, Al Rashah St and Fakhr El-Deen Khalid St. Also we have pointed every tree in Al Geash St (roadside trees- street median – and street gardens)
- We have used Google Earth PRO 7.0.2.8542 in measuring the wide and the length of streets and also in measuring the areas.

*: We have used Google satellite map downloader program to download Mansoura city satellite map, its detail [acquisition Date: 2/3/2004 - longitude and latitude (from 31°04'17.04" N 31°25'09.18" E to 31°00'17.12" N 31°20'49.87" E) size: 378.88 cm width 378.99 cm height] then we used this map in creating figure (1) by Adobe Photoshop CS3.

RESULTS

1- The total area of green areas

Table (1) shows a statement of parks and green spaces in Mansoura city East and West districts (The Local Unit of East District and Information and Decision Support Center, 2008; The Local Unit of West District and Gardens Management, 2008). Figure (1) shows a map of green open areas and sport facilities in Mansoura city.

In a quick survey to Table (1) with garden management directors for East and West district in 2012 we found that the total area of green spaces have been decreased from 2008 to 2012 as following in Table (2). According to this table Mansoura city has lost about 24540 m² of its public green area from 2008 to 2012 as most of it is because of street expansions. On the other hand, there has been adding of 80 m² green area. So the total area of green spaces in East district has become 93370 m² and the total area of green spaces in West district has become 105065 m².

Table (1): Statement of gardens and green spaces in Mansoura East and West districts 2007-2008

Statement of parks and green spaces in Mansoura East 2007-2008			
No.	Name	Location	size
1	Family previously	Al-Geash st.	21850 m ²
2	Flowers previously		
3	Forefronts previously		
4	Child previously		
5	Egypt Air	Al-Geash st.	1000 m ²
6	Al-Geash st. medians	Al-Geash st.	12300 m ²
7	Al-Shennawy Houses	Al-Shennawy Houses	1000 m ²
8	Al-Shennawy basin	Al-Shennawy Houses	60 m ²
9	Ramses Garden	10 st.	400 m ²
10	Fakhr Aldeen Khaled	Fakhr Aldeen Khaled st.	1300 m ²
11	Happy Land garden	Algmehworia st.	8400 m ²
12	Good Morning Egypt garden	Algmehworia st.	550 m ²
13	Al-Mahata station	Al-Mahata Station	150 m ²
14	Al-Shoola station	Happy Land Sq.	220 m ²
15	Gardens of Al shall village	Al-Shall Village	650 m ²
16	Saad Zaghloul st.	Saad Zaghloul st.	7000 m ²
17	Suez Canal st.	Suez Canal st.	12900 m ²
18	The Zoo	Ioril	12750 m ²
19	Turning Jdela	Jdela	550 m ²
20	Rishah Jdela and the Al Mansouria Canal	Mansouria Canal	7500 m ²
21	Abo-Al-Naga Industrial School	behind Health Insurance Jdela	5000 m ²
22	Behind the area and the Administrative Prosecution	Algmehworia st.	240 m ²
Total Green area in East District			93820 m²
Statement of parks and green spaces in Mansoura West 2007-2008			
No.	Name	Location	Size
1	Shagaret El-Durr Garden	Lower Walker st.	66000 m ²
2	Aroos Al-Neel Garden	Algmehworia st.	7500 m ²
3	Gezerat Alward Garden	Lower Walker st.	2900 m ²
4	Al-Fardoos Garden	Al-fardoos station	1800 m ²
5	Villa Gheis Garden	In Front of Villa Gheis	450 m ²
6	Al-Nozha garden	Al Geash st.	2900 m ²
7	Randoblo Garden	In Front of Randoblo's confectioner	200 m ²
8	Hussain Bek Garden	In Front of Hussain Bek Station	450 m ²
9	Al-Sayed Selim Garden	Al-sayed Selim	175 m ²
10	Al-Nabarawy Garden	Markets st.	250 m ²
11	Al-Fardoos city Gardens	Inside Al-Magzar	1400 m ²
12	Al-Adl Al-Tanahy Gardens	Abd-Al-Salam Arer Garden	250 m ²
13	The Military Prosecutor Gardens	Behind the Wholesale Market	750 m ²
14	Bashtamer Garden	The Bashtameir's Houses	1500 m ²
15	Port Said St. Gardens	Port Said St.	1400 m ²
16	Al-galaa Gardens	Al-Galaa Houses	450 m ²
17	Meshaal Gardens	Meshaal Houses	3900 m ²
18	Al-akadawy Garden	Al-Magzer Houses	700 m ²
19	Lower Walker Extent Gardens	Lower Walker	1500 m ²
20	Al-Ghazaly Garden	Al-Ghazaly st.	400 m ²
21	Al-Mahmodia Garden	Al- Alfardoos city	1500 m ²
22	Iaha Hussein Square Garden	Sandoub	1200 m ²
23	Anis Mansour Square Garden	Al-Ihanaweya st.	100 m ²
24	Al-Kanany Garden	Al-Apasy st.	300 m ²
25	Al-Magzer Middle Gardens	Samia Al-Gamal st.	1200 m ²
26	Chest Hospital Sq. Garden	Chest Hospital st.	250 m ²
27	Jehan St. sides Gardens	Jehan st.	1500 m ²
28	Al-sayed Selim st. Gardens	Al-sayed Selim st.	250 m ²
29	Monamed Fathy st. sides Gardens	Al-sayed Selim st.	700 m ²
30	Fashon Garden	The first of Port Said st.	400 m ²
31	Iawfiq Yassin Garden	Iawfiq Yassin Division	900 m ²
32	The Courts Assembler Garden	Al-Geash st.	1200 m ²
33	Al-Pasatin Mosque Garden	Branch of Al-Galaa st.	260 m ²
34	Al-Sheikh Hassanein Garden	Al-sheikh Hassanein Sp.	800 m ²
35	Mansouria Canal Garden	Mansouria Canal	300 m ²
36	sixth Oct. Division Medians	Sixth October Division	500 m ²
37	Middle Gardens Al-Geash st.	Al-Geash st.	10000 m ²
38	Abd Al-Salam Arer st. Medians	Abd Al-Salam Arer st.	2500 m ²
39	Sandoub Entrance Medians	Sandoub Entrance	300 m ²
40	Ahmed Maher St. Medians	Ahmed Maher st.	2000 m ²
41	Jihan St. Medians	Jihan st.	1500 m ²
42	Al-teraa St. Medians	Al-Teraa st.	3500 m ²
43	Al-galaa St. Medians	Al-Galaa st.	2000 m ²
44	Al-Gmehworia St. Medians	Al-Gmehworia St.	1200 m ²
Total green area in West District			129235 m²
Total green area in Mansoura city			223055 m²

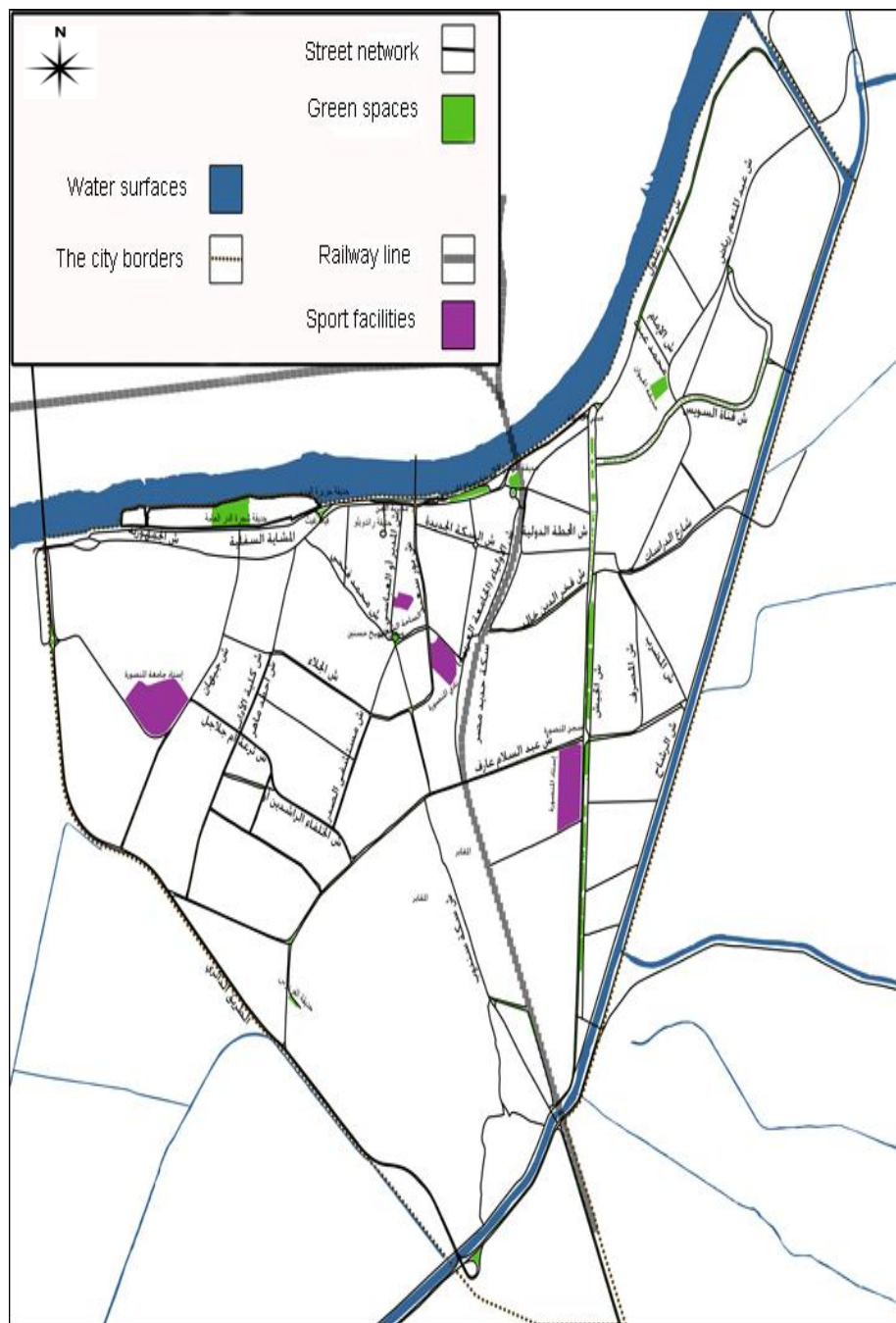


Figure (1): Green, open areas and sport facilities in Mansoura city 2008

Table (2): Green area changes from 2008 to 2012 (m²).

No. in Table 1	Name	Location	2008	2013	Lost green area (m ²)	Added green area (m ²)
	in East district					
19	Turning Jdela	Jdela	550	100	450	
	in Weast district					
12	Al-Adl Al-Tanahy Gardens	Abd-Al-Salam Aaref Garden	250	0	250	
21	Al-Mahmodia Garden	Al- Fardoos City	1500	0	1500	
23	Anis Mansour Square Garden	Al-Thanaweya st.	100	0	100	
25	Al-magzer Middle Gardens	Samia Al-Gamal st.	1200	0	1200	
27	Jehan St. sides Gardens	Jehan st.	1500	0	1500	
37	Middle Gardens Al-Geash St.	Al-Geash st.	10000	1000	9000	
38	Gardens of the Central Islands	Abd Al-Salam Aref st.	2500	2000	500	
40	the Central Island Garden in Ahmed Maher st.	Ahmed Maher st.	2000	0	2000	
41	Gardens of the Central Island Jihan st.	Jihan st.	1500	0	1500	
42	the central island garden Al-teraa st.	Al-Teraa st.	3500	0	3500	
43	the Central Island garden in Al-Galaa st.	Al-Galaa st.	2000	0	2000	
44	the Central Island Garden Algmehworia st.	Al-Gmehworia st.	1200	0	1200	
	Gafar					80
The total lost					24540 m ²	

2- The rates of green areas in Mansoura city

The factors that are taken into account when assessing and calculating green spaces.

These factors illustrate the need to increase green areas in the city of Mansoura as following:

a)

- b) Total population: Total population in 2012 is 489381 (Information Center and Statistics Center, 2013) that make it the second largest city after Al-Mahalla Al-Kubra in Delta cities.
- c) The Residential density: Population density is measured in two ways as coming:
- Density of the city as a whole: It is considered very high, where it is 25756 persons / km² in 2012 (245 persons / ha), and 82.66 % of the homes were more than 3 floors in 2008 (Unit Research and Studies of Planning and Urban Design - College of Engineering - Ain Shams University, 2008).
 - The density of the districts: as in the next table

Table(3): Population density in East and West districts of Mansoura City.

	Population 2012	Area (km ²)	Person/km ²	Person/hectare
West district	265059	12.5	21204	212
East district	258388	6.5	39752	397
Total	489381	19	25756	257

So the city of Mansoura is very high in population number and population density at the level of the city as a whole and at the level of East - West district, which means that the rate of overuse, needs for maintenance and consumption of available green areas are very high and therefore there is an urgent need to increase these green areas in the city of Mansoura to reduce the pressure on these green areas and thus reduce their needs for maintenance.

- d) The surrounding environment: are appropriate and encouraging, where the city of Mansoura is surrounded by agricultural land, Mansouria Canal and Damietta Branch so we can say that the annoying elements (dust - sand - wind) are very limited.
- e) Ages division: The proportion of children (less than 15 years) in 2006 is about 23.8%, those children need playgrounds to provide them with opportunities to climb, bounce, swing, build strength, increase coordination, take risks and interact with their peers. The proportion of youth (those persons between the ages of 15 and 25 years) is about 22% who need places for team sports that teach young people problem-solving, conflict-resolution, and sportsmanship skills. That means 45.8% of the population of Mansoura City are in need for more green areas to practice their different activities. (Central Agency for Public Mobilization and Statistics, 2006)

The per capita green area in Mansoura City from 1949 to 2012

- In 1949 Dr sSharaf-El-Den reported that the total public green area in Mansoura City was about 60000 m² (Sharaf-El-Den, 1977) these green area are represented in four gardens as shown in Table (4):

Table (4) Public green area in Mansoura City in 1949.

Public garden	Area/m ²
Shagaret El-Durr Garden	Approximately 28000 m ²
Al-Kenani Garden	Approximately 12000 m ²
Ferial Garden	Approximately 7000 m ²
Toril Garden	Approximately 12000 m ²

The total population in that time was approximately 100000 capita so the per capita green area was 0.58 m².

- In 1977 the total population jumped to 326000 capita while the total green area decreased where the area of Toril Garden was decreased to 8000 m² and the other three gardens were removed and the areas have been taken by other facilities. So the per capita green area had become about 0.033 m². (Sharaf-El-Den, 1977)
- Table (5) shows that the per capita green area in Mansoura city was decreased from 0.50 m² in 2007 to 0.405 m² in 2013 not just because of the increasing of population but also because of the decreasing of green areas.

Table (5): The per capita green area in Mansoura City

Year	2007			2012		
	Green areas (m ²) 2007	Population 2007	m ² Green area/capita 2007	Green areas (m ²) 2012	Population 2012	m ² Green area/ capita 2012
East district	93820	198081	0.47364462	93370	258388	0.3614
West district	129235	247538	0.52208146	105065	265059	0.3964
Total	223055	445619	0.50055092	198435	489381	0.4055

International Norms for Urban Green Spaces - International minimum standard

Developed countries have tended to adopt a general standard of green space of 20 m² park area per capita (Wang, 2009). The World Health Organization recommends 12m² of green areas per inhabitant in cities (United Nations Environment Programme, 2005).

International minimum standard suggested by World Health Organization (WHO) and adopted by the publications of United Nations Food and Agriculture Organization (FAO) is a minimum availability of 9m² green open space per City Dweller (Kuchelmeister, 1998).

3- Distribution

The following are the most important features of the distribution of the green spaces in the Mansoura City.

- 1-The green areas of the city didn't make a network permeating the body of the city; therefore its aesthetical and environmental role is limited.
- 2-There is no unity in distributing the green areas, moreover there is no connection between its units and they didn't complete themselves.
- 3-There are many parts of the city without green areas.
- 4-There isn't enough use of the surrounding environment (agricultural land - Mansouria Canal –Nile River in creating and distributing the green areas in Mansoura city except "Shagaret El-Durr" Garden and "Aros El-Nile Garden".
- 5-There are no greenbelts for protection around the industrial areas.
- 6-Most of green areas are distributed in a form of very small islands that don't guarantee the provision of peace and quiet, its areas did not allow providing them with equipments and sporting equipments and therefore there is no diversity of activities that can be done in them (except "Shagaret El-Durr" Garden).

4- Green areas changes in Mansura City from 2007 to 2013

Mansura City's green areas have faced a lot of changes in this period from 2007 to 2013.

Lost green areas: Many street median green areas have been removed as shown in table (2) for the sake of widening the roads to face the crowding transportation in the city. The consequent of that is losing about 24540 m² green areas from the period 2007 to 2012.

AlGeash st: (as an example for street green area changes in the city)

Al-Geash st. is the most important street in the city not just because of its position, its length and width but also because of what it has of green areas. It has about 38050 m² green areas with about 1792 trees. This green area have faced many changes in the last 7 years some of these changes were good but there are some comments on these developments as following:

In Table (6) and Figure (3) we review some comments on a part of Al-Geash st (from Sandoub Bridge to Al-Tiran) green area developments from 2007 to 2013. Figures A, B, C are Google Earth photos of the same place with different dates 2/3/2004, 2/1/2010, and 26/1/2013 respectively. The digits in the first row of Table (6) represent the comment areas in A, B and C .

Table (6): Some comments on Al-Geash st. developments from 2007-2013

The area	(A) 2004	(B) 2010	(C) 2013
1,2,3,4	There were 4 gardens sealed with walls	In 2007 their walls have been removed and 1, 2, 3 have become open public street green area with a good spaces of lawn and welcoming seats Figure (3). Area number four half of its area has been taken in the street development.	They have faced many problems in maintaining and keeping lawns in these areas (1, 2, 3) like overuse and bad drainage in many spots so by the end of 2012 they have decided to level up the surface of the soil by building edges 40 cm height around every area and filling it with soil so they can overcome these problems, but we have found that as shown in Figure (4) they have filled it with many types of bad soils like asphalt, clay soil from demolition of houses.
5		Ramses Square has been built.	
6,9,10,11		In Area 6: About 400 m ² area of lawn have been planted over the asphalt after paving the area with a soil depth less than 30 cm with no drainage. Figure (5)	In areas 9,10,11 :As shown in Figure (6) there are three beds with areas about 200m ² , 50m ² , 30m ² .these beds are constructed after paving the entire area with asphalt so these beds didn't have drainage and the soil depth is less than 30 cm
7,8		In Area 7: There was a good street median green area as shown in Figure (7). In Area 8: There was a good street median green area the length of this street median was about 1600 m	In Area 7: By the end of 2010 these green areas were removed and replaced with a line of 20 bed (2.5m *25m) separated with lighting poles. These beds had no drainage and soil depth isn't longer than 40cm and planted with <i>Ficus benjamina</i> , <i>cassia nodosa</i> and lawn .as shown in Figure (8) In Area 8: Also all of these green areas were removed and replaced with about 860 m of street median of 34 bed (2.5m *25m) separated with lighting poles. By this time these beds have a good drainage so their plants were in good shape.

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Figures (3): Al-Geash st. areas (1, 2, 3) 7/9/2008



Figure (4): Bad soils used in area (1) 13-3-2013



Figure (5): Al-Geash st. area (6) 24-9-2010



Figure (6): Al-Geash st. area (11) 3/11/2010



Figure (7): Al-Geash st. area (7) 21/7/2010



Figure (8): Al-Geash st. area (8) 1/10/2013

Shagaret El-Durr Garden (as an example for public garden green area changes in the city).

Shagaret El-Durr Garden is known by its special importance not just for Mansoura City's people but also for all the neighboring cities and villages' residents. Because of what it has of a good area (66000 m²), location on the River Nile (well long Cornish- Boats-Fishing), good entrance view, a good sense of journey and playground for children (Figure, 10).

This garden is known by its crowding visitors in Al-Aaiad as shown in Figure (9), (this photo has been taken in the third day of Ead Al-Fetr, 2010). Visiting the garden was a very important part in the wedding program for the city's and the neighboring cities and villages residents but lately this phenomenon has been decreased because of the status of this garden now.

This garden has faced many changes lately; the following are some negative changes as shown in Figure (10):

- About 750 m² were taken from the garden area in 2013 to be a car parking
- There are now about ten booth café for selling drink. Every booth café has chairs in a certain area for the people to set on them so they can sell drinks for them. Most of those booth cafés have DJ.
- They have installed Amusement Park facilities in the children's playground; this playground area was about 3,500 m².



Figure (9): the Garden of Shagaret El-Durr 12/8/2010

5- Types

The next table shows that the types of green areas in Mansoura City are very limited and half of the types that are internationally recognized don't exist.

Table (7): Green area types in Mansoura City.

No.	Type	Number and location
1	Square gardens	7
2	Parks	8
3	Kids Parks	Part in Shagret El-Dorr Garden, Beside El-Nasr Mosque and El-Geash st.
4	Cultural Parks	0
5	Sport Parks	0
9	Forest Parks	0
7	Street trees	In most of the main roads
8	Gardens of public facilities	University - some hospitals - some schools
9	Gardens of residential communities	7
10	Protection zones	0
11	Botanical gardens and zoo	One Zoo
12	Camps	0
13	Cemeteries	0
14	Forests	0
15	Areas of agriculture and horticulture	around the city

6- Maintenance

The level of maintenance is very low because of:-

The green spaces in Mansoura City are lacking for most of the modern maintaining tools that are necessary for maintaining it as shown in Table (8)(The Local Unit of East District and Gardens Management, 2010; The Local Unit of West District and Gardens Management, 2010). For example, there are just two lawn mowers 5.5 horsepower and one tractor grass mower 15 horsepower in East District and one lawn mower 5.5 horsepower in West District those aren't enough completely to mow all the lawns so some times the lawns are mowed by sickle after being too tall.

Table: (8): The Available gardening tools in East and West Districts of Mansoura City in (2010)

East District	Units number	West District	Units number
Lawn mower 5.5 horsepower	2	Lawn mower 5 horsepower	1
Tractor grass mower 15 horsepower	1	pruning saw	2
Little tractor with trailer	1	Axes different sizes	3
Big tractor for irrigation in summer and usurping rain water in winter	2	Pruning shears for 5 workers for trees and hedge clipping	5
Street sprinkler truck	1	Water truck	1
Native axe (Hoe)	1	Native axes (Hoe)	5
Digging spade	1	Maktuf (leather basket)	5
Sickle	1	Sickle	10
Ax	1	Pick mattock	3
Rake	1	Rake	5
Heavy Hammer	1		

The spent on green areas in Mansoura City is very low where the expenses per m² were 0.417 EGP/m² in 2010 as shown in Table (9) (The Local Unit of East District and Gardens Management, 2010; The Local Unit of West District and Gardens Management, 2010). There was no buying of fertilizers and pesticides for a considerable period. The spending on green spaces in some countries could exceed 10 % of the total construction costs.

Table (9): Shows the Green areas expenses during fiscal year (2009/2010) in Mansoura city

Character	East District Expenses (EGP)	West District Expenses (EGP)
Buying plants	43324.64	
Maintenance works	31683.4	2800 for pruning 350 palm tree 37270 for buying one spraying device and fog device to Sprinkle the district streets 4850 for buying lawn mower 2600 for Mummified animals Maintenance 6400 for buying Water Pump-Calpeda
Transport	6600 3250 1335	
Total	68008.05 EGP	53920 EGP
Expenses Per m ² green area	0.724877 EGP/m ²	0.4172 EGP/m ²
Expenses Per capita	0.33 EGP/capita	0.206 EGP/capita

7- Street trees

We have made a field survey for 22 of Mansoura City main and secondary streets using Mansoura City satellite map. We have made that survey by pointing out roadside trees in the streets under study and also we have pointed street median trees in Saad Zaghoul st., Kanat Al Sweis st., Al Rashah st. and Fakhr El-Deen Khalid st.. Also we have pointed out every tree in Al Geash st. (roadside trees- street median – and street gardens)

In this survey we found that:

- 1- The variation in street tree species is very poor where *Ficus retusa* represents 67.67 % of the street trees (5220 tree), followed by *Ficus benjamina* 7.9 % (611 trees), then *Delonix regia* 7.04 % (543 trees).
 - 2- The number of died or absent street trees is 415 in the streets that are under study.
 - 3- The standard conditions haven't taken into account in planting many of street trees like
 - a. Removing the tree container before planting them.
 - b. Digging the appropriate holes (depth and width) for planting the trees.
 - c. Checking the soil and improving it when needed.
 - 4- Many of street trees after planting them weren't conducted with the process of patching, so the appearance of the streets is characterized as irregular.
 - 5- It's a very few to find street trees with its full size.
 - 6- All trees in the streets under study represent 12855 m² of green area in Mansoura City, (we didn't add that number to the total green area of the city because most of these streets trees green areas are already counted in Table (1)).
- Tree number in streets is the highest in Al-Geash with 1792 followed by Al-Rashaah St 927 then Saad Zghloul St 851. The least number of st. Trees are in Al-Sekka Al Gadida st. 13 tree, Al Abbassi st. 37 tree, Mohamed Fathi st. 42 trees.
- 7- In case of full afforestation the total number of street trees in the streets under study will increase from 7713 to 17473 trees and the total green area of these street trees will increase from 17997 to 40770 m².(estimating that 7m is the average distance between trees)

DISCUSSION

Our recommendations and suggestions are mentioned in three main groups, namely:

First: Steps are now available:

- 1- It's important to maintain the existing public and private green area units by supporting them with appropriate plants, tools and fertilizers.
- 2- Urban Afforestation project: with the help of civil society organizations a complete street survey should be made all over the city of Mansoura to identify and map the exact locations for street tree planting. Typically locations must be chosen in such a way that electric lines don't go above,

there aren't any objections from the people nearby, it doesn't affect the pedestrians and vehicular movements etc.

- 3- Encouraging corporates, Educational Institutions and Residential Associations to take up tree planting in their respective campuses.
- 4- Educate people about the benefits of tree planting and its conservation.
- 5- Keeping a check on unauthorized tree cuttings across the city.
- 6- Planting a lot of trees on the banks of the Nile River and Al-Mansoria Canal.
- 7- Working on encouraging and nourishing fish resources in the Nile River and Al-Mansoria Canal to encourage fishing in them.
- 8- Planting fruit trees like *Morus alba* and *Ficus sycomorus* on the water surfaces banks and agriculture fields around the city for their wood and also to encourage people to make a journey to them in fruiting seasons.

Second: the development of a short-term plan:

This plan is a part of the long-term plan and it could be done in shorter period (20-50 years).as following:

- 9- Locating suitable places to be converted to public parks in the near future, and putting them in mind when making a long-term plan. As an example of these places the existing barns - the prison ranch. We must, and I refer here to some units of this plan may regulate short - range - depending on the circumstances which may be developed to the possibilities currently available and that we will be discussing immediately.
- 10- Apply the afforestation planting standards in the city as a whole including all types of afforestation (protection, blocking and streets etc.) with bearing in mind that every 1 ½ m long of planted street with two rows of trees is equal to 1 m² of green spaces (Sharaf-El-Den, 1979), and putting in account also the most appropriate basis for the selection of appropriate plant material.
- 11- Redesign the water surfaces for public use where Mansoura City has Demietta Branch of River Nile running beside it (1,340,470 m² -7 km long) and Al-Mansoria Canal (367,800 m² -6.7 km long). There are a lot of activities that people can enjoy doing them in these areas (fishing - feeding fish – walking – reading – rowing ...) so its areas could be added to that total green areas of the city.

Third: the development of a long-term plan:

It is the treatment of choice, but a longer lifetime treatment methods, may need to be 50 - 100 years to achieve. Such a plan should be developed by specialists in creating, distributing and maintaining of green areas, assisted by representatives from various city facilities (Urban planners - etc.). The aim of such a plan is to develop the main vegetation structure of the city including all kinds of green space needed by the city, its distribution, the means of connecting its units and its method of growth in the future. (Sharaf-El-Den, 1977)

Adding green areas:

The inferior situation of green areas in Mansoura City leads us to search within and even outside the city of Mansoura for places that can be used now (steps are now available)or in the near future (development of a short-term plan) or in long run (development of a long-term plan) - after the cessation of the current activity – as green area (e.g. gins - rackets - sean and silos - graves - garbage dumps - railway and the train station..... etc.) but that will collide with expropriation and activate the public interest procedures regarding to private property and even public property (business sector) and the targeting of graves and garbage dumps, and the railway which are real additions they need a long time as in graves case (do not use only after fifteen years of closing) and re - processing as in the case of garbage dumps, with what it costs of high expenses . All of these obstacles should not discourage us from a precondition determining for such places and accounting them. (Sharaf-El-Den, 1977)

The following map and table show places that are State and Endowment properties and other places that are available to be transformed to green area.

Table (10): State and Endowment properties (Unit Research and Studies of Planning and Urban Design - College of Engineering - Ain Shams University, 2008)and other places that are available to be transformed to green area.

No. on Figure (11)	Name	Area (m ²)
1	-	42,326
2	Workshop No. 10 vehicles (ARMY)	55,934
3	-	14,998
4	-	31,933
5	El-Shall Village Barn	9,710
6	Graves	5,845
7	Wholesale Market	16,875
8	Issawi graves	174,567
9	Copts graves	60,513
10	-	151,233
11	The main	30,816
12	Mansoura Railway workshops and cotton gin	82,787
13	Mansoura Railway and Train Station	171,605 – 5 km long
14	-	202,865
15	El-Shall Racket rice	26,675
16	El-Atribi Pasha Racket rice	13,884
17	-	59,293
18	Traffic	45,930
19	-	21,948
20	Bank Misr Barn	16,335
Total area (m ²)		1,236,072 305.4 Feddan

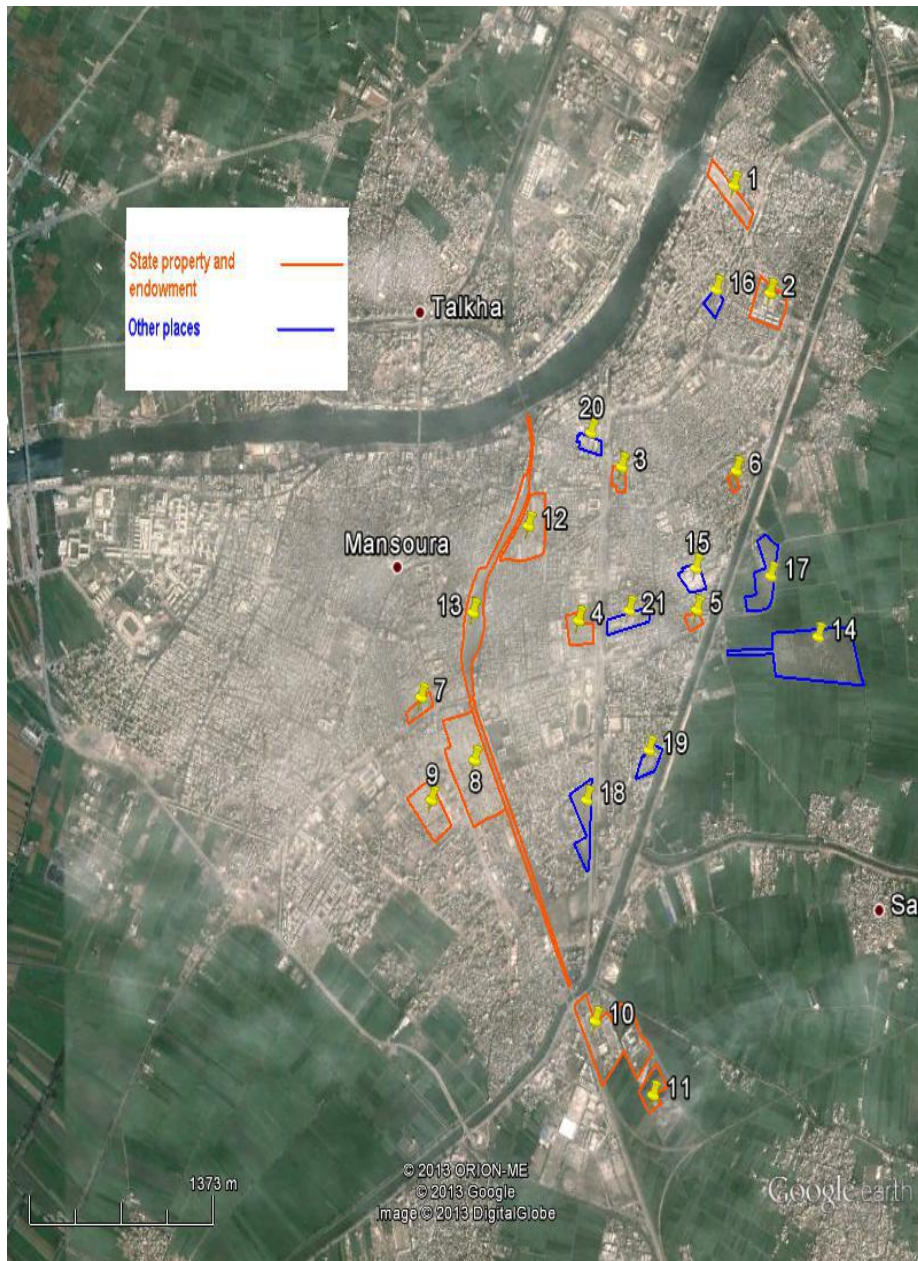


Figure (11): State and Endowment properties and other places that are available to be transformed to green area.

As for places outside the city will always come up against the surrounding agricultural lands and the need to preserve them (according to the National Development Principles it is important not to change the agricultural lands and conserve its fertility and productivity), but Mansoura City has a back of desert (Gamasa) can provide a real addition to green spaces, long distance here is not obstacle to enjoy these added spaces by its strong attraction in terms of design and equipments..... etc. (Cairo and Al-Qanater Gardens for example) and there is a tremendous opportunity to add full ten feddans is the area of the peninsula arising from the establishment of Heuss Mit Ghamr (distance here is less than the distance to Gamasa) and accessible - as well as land transportation - by water transportation will be a special charm for visitors.

The all Proposed green areas:

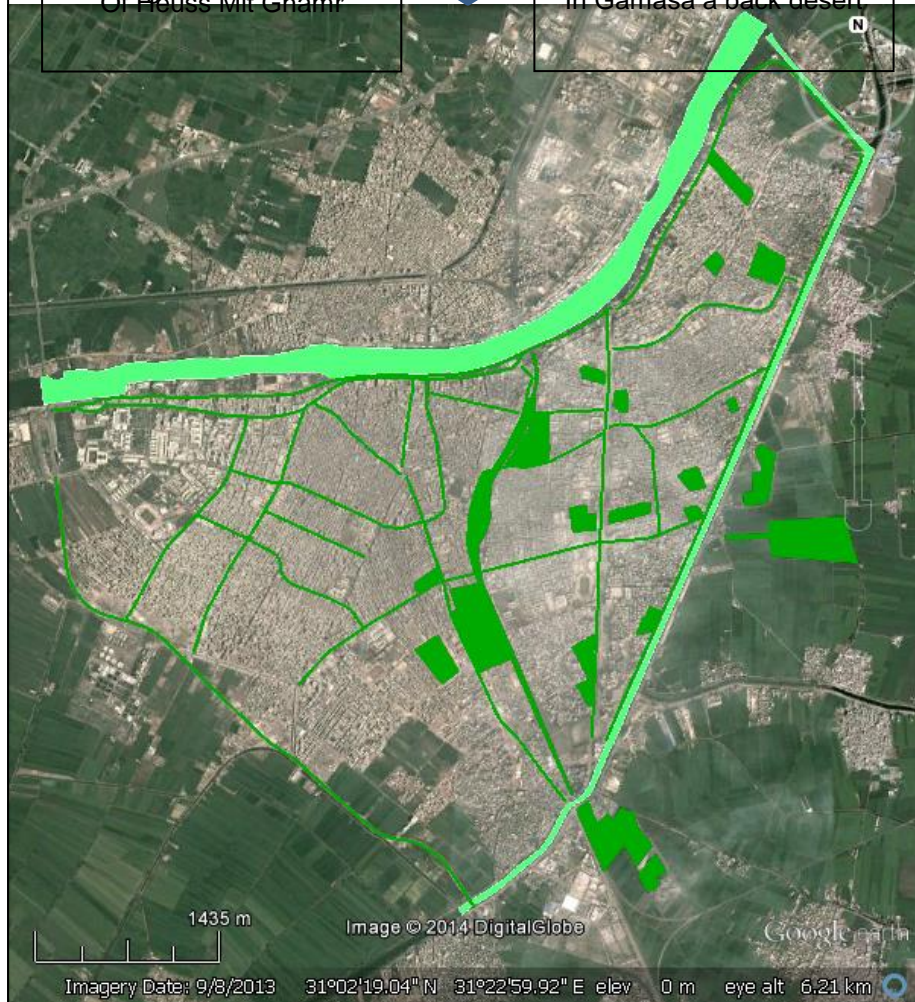
Table (11) and Figure (12) show that all green areas that are resulted from our proposal. The total area that is proposed to be added to the current green areas of Mansoura city is 2845605 m², this area will maximize the current green area to 14.3 times.

Table (11) The all proposed green areas for Mansoura City.

The all proposed green areas	Area (m²)
State and Endowment properties	1,236,072
A back desert of Mansoura city (Gamasa)	210,000 (50 feddan)
Heuss Mit Ghamr	42000 (10 feddan)
Planting 10000 street trees	16666
Water surfaces	1340867
Total	2845605 m ² (677.5 feddan)

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Figure (12): The all purposed green areas for Mansoura City.

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دراسات على المساحات الخضراء في مدينة المنصورة

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أجرى هذا البحث في نطاق مدينة المنصورة بمحافظة الدقهلية خلال الفترة من ٢٠٠٨-٢٠١٣. بهدف دراسة الوضع القائم للمساحات الخضراء بمدينة المنصورة كمثال للمدن المصرية (المزدحمة) ومعرفة مدى كفاية هذه المساحات كما و نوعا مع إقتراح الحلول المناسبة لذلك. حيث قمنا بدراسة المساحات الخضراء في مدينة المنصورة من حيث المساحة الكلية للمساحات الخضراء، معدلات المساحات الخضراء في المدينة (العوامل التي تؤخذ في الإعتبار عند تقييم وحساب المساحات الخضراء – نصيب الفرد من المساحات الخضراء في مدينة المنصورة خلال الأعوام التالية: ١٩٤٩ , ١٩٧٧ , ٢٠٠٧ , ٢٠١٣)، توزيع المساحات الخضراء داخل المدينة. تطورات المساحات الخضراء في مدينة المنصورة خلال الفترة من ٢٠٠٧ حتى ٢٠١٣ متضمنا المساحات الخضراء التي تمت إزالتها نتيجة توسعات الطرق وتطورات شارع الجيش خلال الفترة من ٢٠٠٧ حتى ٢٠١٣ وحديقة شجرة الدر العامة، أنواع المساحات الخضراء في مدينة المنصورة، الصيانة (الآلات و الأدوات المتاحة في كل من حي شرق وغرب المنصورة خلال عام ٢٠١٠ ومعدل الإنفاق على المساحات الخضراء خلال سنة مالية كاملة (٢٠٠٩/٢٠١٠) ، وأخيرا حصر ميداني لأشجار الشوارع في ٢٢ شارع في مدينة المنصورة .

بصفة عامة أظهرت النتائج الآتي: مستوى المساحات الخضراء في مدينة المنصورة متواضع جدا من حيث المساحة والأنواع والتوزيع و الصيانة حيث أن: توزيع المساحات الخضراء لا يمثل شبكة تتخلل جسم المدينة وليس هناك وحدة بين أجزائها وهناك مناطق عديدة من المدينة بدون مساحات خضراء وليس هناك إستعمال جيد للبيئة المحيطة المتمثلة في المسطحات المائية والأراضي الزراعية ما عدا الكورنيش وحديقة شجرة الدر وحديقة عروس النيل ،معظم المساحات الخضراء عبارة عن جزر صغيرة منعزلة لا تضمن توافر الهدوء وكذلك صغر مساحتها لا يسمح بالتنوع في الأنشطة المتاحة ما عدا حديقة شجرة الدر. وقد وجد أن نصيب الفرد من المساحات الخضراء في مدينة المنصورة في عام ٢٠١٢ كان في حدود ٠.٤٠٥٥ م^٢ / فرد بينما تراوح نصيب الفرد من المساحات الخضراء في عام ٢٠٠٧ في حدود ٠.٥ م^٢ / فرد ٢٠٠٧ حيث ذلك النقص حدث نتيجة لزيادة عدد السكان والنقص في المساحات الخضراء ،وقد وجد أن الإنفاق على المساحات الخضراء عام ٢٠١٠/٢٠٠٩ كان في حدود ٠.٤١٢ جنيه مصري/ م^٢ .وبالنسبة لأشجار الشوارع فقد أظهر الحصر الميداني سيادة نوع واحد من الأشجار متمثل في *Ficus retusa*. ولتحسين وضع المساحات الخضراء في مدينة المنصورة فقد إقترحنا خطوات يمكن إجراؤها حاليا وخطة على المدى القصير وخطة على المدى الطويل مع إضافة مساحات خضراء جديدة.

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