

ÉCOLE POLYTECHNIQUE DE L'UNIVERSITE FRANÇOIS RABELAIS DE TOURS Spécialité
Spécialité Aménagement et environnement
35 allée Ferdinand de Lesseps
37200 TOURS, FRANCE
Tél +33 (0)247.361.450
www.polytech.univ-tours.fr

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Green Spaces Under Threat: The Case of Damascus



By HASANEN, Alaa

Prof. VERDELLI, Laura

"Damascus is simply an oasis, that is what it is.
For four thousand years its waters have not gone dry or its fertility failed.
Now we can understand why the city has existed so long. It could not die.
So long as its waters remain to it away out there in the midst of that
howling desert, so long will Damascus live to bless the sight
of the tired and thirsty wayfarer."

(Mark Twain, 1872)

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Table of Contents

INTRODUCTION.....	3
RESEARCH OBJECTIVES	4
METHODOLOGY AND THE STRUCTURE OF THE DISSERTATION:.....	5

CHAPTER 1

Green Spaces: Types and Importance.

1.1. TERMS AND DEFINITIONS	7
1.2. TYPES OF GREEN SPACES IN THE CITIES	9
1.3. RELATIONSHIP BETWEEN THE RIVERS AND GREEN AREAS.	12
1.4. DESIGN STANDARDS FOR GREEN SPACES IN CITIES.	12
1.5. THE BENEFITS OF THE GREEN SPACES.	14

CHAPTER 2

The Urban Formation of Greater Damascus: Green Spaces all Over its History.

2.1. INTRODUCTION.....	17
2.2. DAMASCUS: ITS EARLY FORMATION.....	17
2.3. DAMASCUS UNDER ISLAMIC RULE.....	20
2.4. DAMASCUS UNDER THE OTTOMAN EMPIRE.....	21
2.5. POST-WORLD-WAR I DAMASCUS – THE FRENCH MANDATE	25
2.6. DAMASCUS AFTER INDEPENDENCE: URBAN CHANGE AND ECOLOGICAL IMBALANCE	26
2.7. CONCLUSION.....	32

CHAPTER 3

Damascus Today: The Threats of Unplanned Urban Growth on the City's Green Spaces.

3.1. INTRODUCTION.....	33
3.2. CONTEMPORARY DAMASCUS: ILLEGAL HOUSING SETTLEMENTS.....	33
3.3. THE ROLE OF THE NATIONAL URBAN POLICIES	37
3.4. ACCELERATION OF THE INFORMAL URBANIZATION WITH THE START OF SYRIA'S WAR	41
3.5. THE SITUATION OF INFORMAL SETTLEMENTS IN THE MIDST OF SYRIA'S WAR.	43
3.6. THE POLITICS OF URBAN RECONSTRUCTION IN SYRIA.....	44
3.7. THE GOVERNMENT RESPONSE TO PRESERVE GREEN SPACES.....	47
3.8. CONCLUSION.....	49

CHAPTER 4

The Risk to Damascus' Green Spaces: National & International Reaction

4.1. INTRODUCTION.....	50
4.2. NATIONAL AND INTERNATIONAL NGO'S REACTION	51
4.3. THE IMPORTANCE OF THE CITY'S GREEN BELT AND IT'S IMPACT ON POPULATION-ENVIRONMENT.....	52
4.4. CULTURAL RESPONSE.....	53

Conclusion

List of Figures

FIGURE 1. FLOW CHART ILLUSTRATING THE RESEARCH DESIGN. 6

FIGURE 2. TISHREEN PARK, DAMASCUS SOURCE: GOOGLE IMAGES 9

FIGURE 3. IBN AL-HAYTHAM PARK, DAMASCUS SOURCE: GOOGLE IMAGES 9

FIGURE 4. THE BASIN OF THE STREAM OF THE BARADA RIVER, DAMASCUS SOURCE: GOOGLE IMAGES 10

FIGURE 5. DIAGRAM OF SPACES IN AN URBAN LANDSCAPE SOURCE: MEHDI & OHARI, 2017..... 11

FIGURE 7. THE GREEK TEMPLE OF JUPITER AND DAMASCUS STREET MAP SOURCE: BURNS, 2005 18

FIGURE 6. THE GREEK CITY LOCATED WITHIN TODAY’S DAMASCUS OLD CITY WALLS. SOURCE: BURNS, 2005 18

FIGURE 8. THE ROMAN CITY OF DAMASCUS SOURCE: BURNS, 2005 19

FIGURE 9. HISTORICAL DEVELOPMENT OF DAMASCUS SOURCE: AL-QATTAN, 2002 22

FIGURE 10. SECTION OF AL-MUHAJIRIN PLAN 1945 SOURCE: ARNAUD, 2006 P. 174..... 23

FIGURE 11. DAMASCUS CITY 1929 SOURCE : BUREAU TOPOGRAPHIQUE DES TROUPES FRANCAISES DU LEVANT, 1992..... 24

FIGURE 12. THE GROWTH OF DAMASCUS 1938-1994 SOURCE: EL-IBRAHIM, 2001. PAGE 80 27

FIGURE 13. HISTORIC RAINFALL MONITORING DATA FOR DAMASCUS CITY SOURCE: MINISTRY OF IRRIGATION, 2013..... 30

FIGURE 14. SOLAR DATA ANALYSIS SOURCE: DAMASCUS GOVERNMENT, 2013 31

FIGURE 15. WIND DATA ANALYSIS SOURCE: DAMASCUS GOVERNMENT, 2013..... 31

FIGURE 16. DISTRIBUTION OF THE ILLEGAL SETTLEMENTS IN GREATER DAMASCUS SOURCE: REGIONAL PLANNING COMMISSION (2013) 34

FIGURE 17. THE ILLEGAL URBAN SPRAWL ON THE PRESERVED GREEN SPACES OF THE CITY OF DAMASCUS SOURCE: AUTHOR..... 36

FIGURE 18. A STREET VIEW FROM THE INFORMAL SETTLEMENTS IN MAZZA 86 AREA SOURCE: AUTHOR, 2013 38

FIGURE 19. NEW DEVELOPED URBAN BOUNDARIES FOR ILLEGAL SETTLEMENT AREAS SOURCE: REGIONAL PLANNING COMMISSION (2013) 40

FIGURE 20. THE ILLEGAL SETTLEMENTS GROWTH IN AL-MLEHA, DAMASCUS BETWEEN 2000 AND 2018 SOURCE: GOOGLE EARTH 41

FIGURE 21. SATELLITE IMAGE SHOWING THE EXTENT OF DESTRUCTION IN INFORMAL SETTLEMENTS AREAS IN JOBAR DISTRICT IN DAMASCUS. SOURCE: GOOGLE EARTH, 2019..... 43

FIGURE 22. MAROTA CITY’S MASTER PLAN. SOURCE: MAROTA CITY 46

FIGURE 23. ONE OF THE EASTERN PARK PROJECT PROPOSALS, DAMASCUS SOURCE: MAG LAB 49

FIGURE 24. MASSAR INTERACTIVE PUBLIC PARKS SOURCE: SYRIA TRUST FOR DEVELOPMENT..... 51

FIGURE 25. KASAR AL AZEM COURTYARD SOURCE: AUTHOR, 2019..... 53

FIGURE 26. DAMASCENE HOUSES INNER COURTYARDS SOURCE: AL BAROUDI, 1978 53

FIGURE 27. SECTION SHOWING THE ROLE OF TREES IN THE MOISTURIZING THE INNER ENVIRONMENT AND THE MOVEMENT OF AIR CURRENTS IN THE INNER COURTYARDS. SOURCE: AUTHOR..... 54

List of Tables:

▪ **TABLE 1. GREEN AREAS PER CAPITA IN SQUARE METERS..... 50**

Introduction

The significance of green space around the local areas and urban areas has been perceived to differing degrees since the nineteenth century when its value in giving a getaway from across the board urban air pollution was a major driver in making new public parks and green spaces due to the fact that green spaces serve as the lungs of any metropolitan area, and are one of the most significant elements of any urban ecosystem. Unfortunately, its importance is often ignored due to the rapid urbanization in recent years. This makes urban developments the primary source of Greenhouse Gases emissions and the reason for Ozone depletion and Global Warming.

There was a significant change in this world in the last century. One of which is a substantial increase in the quantity of urban population when compared with the population in the provincial regions. In 1950, there was just 30% of the total population in urban territories, however in 2018 about 55.3% of the world's population living in urban settlements. It implies that the more significant part of the total population presently lives in urban regions. Based on the United Nation (UN, 2018), by 2030, about 60% of the world's population and one in every three people will live in cities with at least half a million inhabitants. Rapid and unplanned urban growth, as well as urban expansion, threatens green spaces when the necessary infrastructure is not developed or when policies are not well-implemented. Urbanization has led to the rapid destruction of green spaces around the world. The main forms are slums, encroachments and squatter settlements. This not only affects the ecosystem but often results in spoiling the aesthetics of the city and become non-surveillance areas of illegal activities. Thus, imposing a serious threat to the quality of life in an urban area. The increased urbanization results in pollution which form an indirect variable in affecting the green spaces, the increased dumping of sewage, garbage and industrial effluents in the natural ecosystems like rivers and lakes, affects the areas it flows through, often contaminating the groundwater.

Syria is confronting a major threat to its green areas as well as expanding the population in the course of the most recent 50 years. Syria's population has grown fifteen-fold since 1922. The urban population in Syria has expanded from 30.50% in 1950 to 52.2% in 1995 (Syrian Center for Statistic and Research, 2012). Urbanization was a consequence of a move of the population from agricultural to industry and services, particularly in urban centers such as Damascus and Aleppo. Damascus is the capital of the Syrian Arab Republic. Situated in south-western Syria, Damascus is the focal point of a vast metropolitan territory of 1.8 million individuals (2009). Damascus experiences a Semi-arid atmosphere. Due to the fast urbanization in the ongoing years, the city faces an unprecedented increment in population which brought increment in the slum area and exhaustion of the existing green zones of the city. This increases the pressure in the distribution of the natural system and reduces the quality of living in the urban area. Components that energized this movement include consecutive major drought between 1978 and 1983 in the semiarid terrains, soil degradation, and joblessness and unfortunate financial circumstances in rural territories.

The Governmental Policies are often not enforced, monitored or regulated. Though there are research works around the world regarding the importance of green areas in Urban areas, there is a gap between planning and implementation of these concepts. Thus, this research aims at understanding the issues and analyzing it from the grassroots level and provide suggestions for the implementation and management of the plans and policies.

Research Objectives

Research Problems:

The research analyses the problem faced in the study area as follows:

- The decreasing of green spaces in Greater Damascus.
- The absence of integrated environmental planning for the city, knowing that it is rich in ecological, cultural, and historical elements.
- Lack of clear and sustainable strategies to limit and reduce unplanned urban growth.
- Lack of monitoring and implementation of laws in the development of architecture and urban planning.

Research Aim:

The research study aims to shed light on policies and practices threatening the green spaces in Greater Damascus in Syria, where the country is confronting a lot of ecological, urban, social and economic challenges, especially after its war with global terrorism (2012-2018). These challenges have many negative effects on the country's quality of living, proficiency, and performance. The cities in Syria faces numerous urban problems and challenges, including urban deterioration, slums, and informal regions, land use conflicts, lack of essential services and infrastructure, street systems and roads turned parking lots, populace densities, urban spread on the agricultural land, ecological and visual pollution, concentration of economic activities in specific urban centers, and so forth.

Methodology and The Structure of The Dissertation:

This research is correlational research depending on the analytical approach. The aim of correlational research is to find the relationships between two or more variables, which in my study are the urbanization and the green spaces, this research is going to help us understand related events, conditions, and behaviors to make predictions of how one variable might predict another and to examine the possible existence of causation.

The methodology of the research is based on Qualitative Research Strategy looking at how and why such change is happening and not just where and when it took place, influenced by a Marx's philosophy of research, which was described by Harvey "the research has to be directed to discovering the transformation rules whereby society is constantly being restructures. Rather than to finding "causes" in the isolated sense that follows from a presupposition of atomistic association, or to "identifying" stages or "descriptive laws" governing the evolution of totalities independent of their parts" (Harvey, 1973). Furthermore, the methodology applied a Descriptive and Meta-Analysis Research Design to investigate the change, through analyzing the Green Space of Greater Damascus within various time laps to signify the challenges and possibilities of each phase, and within different techniques that varied between theoretical and scientific analyses, practices inspections and interviews.

Accordingly, this research is divided into three main sections forming the conceptual, theoretical and analytical frameworks of the thesis (Figure 01). The conceptual framework is covered in this chapter, the theoretical framework constitutes the literature review, and the analytical framework is where the different parameters and variables influencing the research are identified and analyzed. The significant variables are identified as urbanization, slums, green areas, rivers, pollution, policies, and population. The defined variables have both dependent and independent characteristics. These relations between the variables are studied to arrive at the conclusions and recommendations for future work.

RESEARCH DESIGN

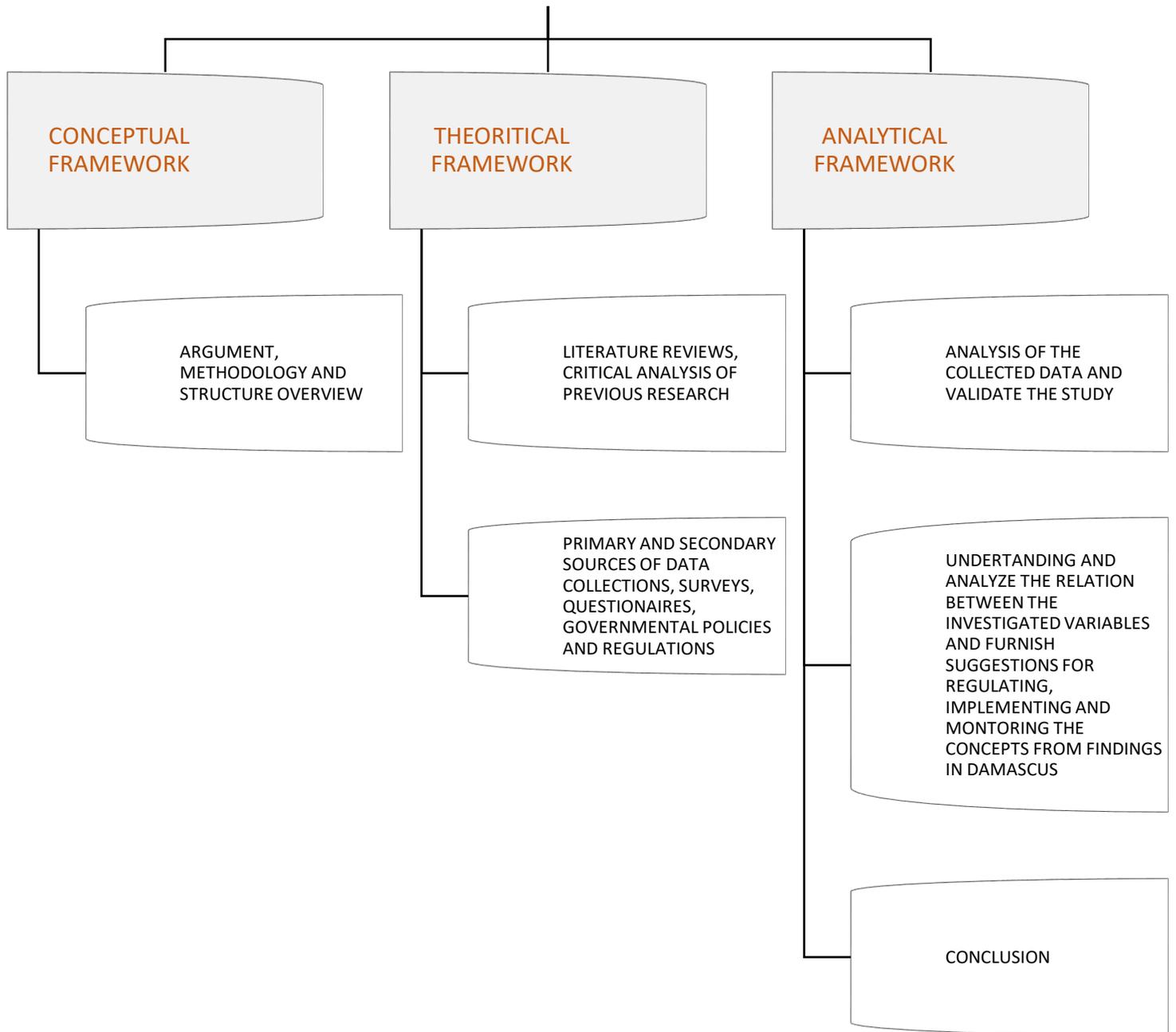


Figure 1. Flow chart illustrating the Research Design.

CHAPTER 1

Green Spaces: Types, Standards and importance

1.1. Terms and Definitions

- **Urban Environment**

An urban environment is the environment of a city; typically described by numerous buildings in a constrained measure of space, with a high per capita per square meter. The vast majority of the living spaces, working spaces, shopping zones, educational facilities, services, and so on are assembled in nearness to one another. It is normally formed by limited open zones in specifically planned zones or places that have been abandoned due to the higher estimation of land in urban territories. An urban area is frequently plagued by the absence of room for vehicles and a higher expense for renting space for regular parking of vehicles since that likewise requires the utilization of costly land.

- **Urban Space**

Urban space is a region surrounding a city. Most of the people who are living in urban areas have nonagricultural jobs. Urban territories are very advanced, which means there is a density of human structures, for example, houses, business structures, streets, bridges, and railroads. Urban space is typified by what is known as a "city"; a city is a gathering of individuals and institutional structures that advance the proficient communication among people and spot. Urban space has often increased in population to the point that it serves as a synergistic force for the social construction of the suburb. Ironically, suburbs have decided that the only means for their survival is to mirror urban areas – formal social relationships and complex institutional arrangements (Woolley, 2003).

- **Public Space**

Public space is a space where we share with the other people who aren't our friends, relatives, or work associates. This space is for sport, religion, commerce, and politics and also a space for peaceful coexistence and impersonal encounter (Woolley, 2003). Its character can express and condition our civic culture and public life. In this way, it very well may be characterized as the space that is available to all, possessed by all and utilized by all individuals from general society. In spite of the fact that local authorities own most of the open spaces, even with public land, duties can fall between various departments, for example, parks, roadways, and so on.

- **Open Space**

Open space is normally characterized as any land that is undeveloped and has no building structure on it. Another definition appears in "Metropolitan Open Space Act" made in London in Britain in 1877 and then in 1906, defined the open space as any land, less than 5% of which is occupied with buildings (Wang & Gao, 2012). However, since it is believed that, plazas, playing fields and urban squares are contributing to improving public health and environmental quality of the neighborhood, they are often included in the definition as well (Olsson, 2012).

- **Green Infrastructure**

It is a network providing the ingredients in both rural and urban areas for solving urban and climatic challenges by building with nature, which underpins the sustainability and increases the quality of life with its natural and ecological processes (Olsson, 2012)

- **Green Space**

Green spaces (or "urban green") are spaces in an urban environment which have any amount of vegetation, such as parks, urban agriculture, urban woods, private greenhouses, street trees or rooftop gardens. The green infrastructure concept emerges as a multi-object strategic planning approach implementing these various types of urban green spaces on different scales. Urban green is increasingly recognized as the primary provider of ecosystem services supporting human prosperity in urban areas.

- **Open Space Reserve**

Open space reserve is a territory of protected or conserved land or water (urban or rural) on which development is uncertainty put aside. The objective for an open space reserve can be:

1. The protection or preservation of land or water territory for aesthetic, ecological, environmental, agricultural and recreational interests.
2. The administration of a community or area's development as far as industry, advancement, or characteristic assets extraction.
3. The protection or preservation of a community or district's rural natural or notable character.

- **Urban Landscape**

The urban landscape is formed by open and green space in an urban environment, while it is not independent of surrounding structure and buildings. Urban landscapes are typically a complex combination of buildings, roads, grass, trees, soil, water, and so on (Lu & Weng, 2004) Landscapes are increasingly significant to urban dwellers as they provide tangible evidence of continuity and sense of place in the changing urban environment (Tahir & Roe, 2012).

1.2.Types of green spaces in the cities

We can classify green spaces in the cities into:

1.2.1. Public Green Space:

1. National Public Parks

At the city level and its territory, national or local public parks serve all its visitors of the city's inhabitants, usually include wooded areas, playgrounds for children, water items, tourist and recreational services, and integrated public facilities, which are connected by multiple corridors with all necessary urban elements. Damascus city has a lot of this example like Tishreen Park (Figure 02) which located in the west of the city north of Barada River.



Figure 2. Tishreen Park, Damascus

Source: Google Images

2. Small, Medium or local public Parks

At the local level, in forms of small and medium parks which located in neighborhoods and around the city's zones, today has become an essential part of any city plan, these types of green spaces usually have the same facilities as large public parks such as children's playgrounds, tourist and leisure services. But on a limited scale, such as Ibn Al-Haytham Park (Figure 3) in the neighborhood of Al-Tijara and Zaki Al Arsouzi park in neighborhood of Al-Mazraa.



Figure 3. Ibn Al-Haytham Park, Damascus

Source: Google Images

3. Street Trees

Planting trees in urban areas have several environmental, social and ecological advantages, by provide a cooling effect due to shading and evapotranspiration from the canopy and help to improve air quality due to the production of oxygen and adsorption of air-borne pollutants such as polycyclic aromatic hydrocarbons (PAHs) and by mitigating carbon emission. The tree species that are picked for urban regions all exhibit characteristics related to urban suitability, for example, tolerance of harsh conditions.

4. Green Corridors

Usually shaped by the areas adjacent to the rivers and defined the areas which provides connectivity between landscapes, ecosystems and habitats, natural or modified and refers to a linear or ribbon ecological landscape, for example, the basin of the stream of the Barada river (Figure 4) which passes through the city of Damascus.



Figure 4. The Basin of the stream of the Barada river, Damascus

Source: Google Images

1.2.2. Private Green Space:

1. Green Roofs:

Vegetated layers that lied on top of the conventional waterproofed roof surfaces of a building. Green roofs are designed to be sustainable and have several benefits for the environment.

2. Building's landscape:

Which is designed to include green infrastructures such as tree planters, ponds, grass and lawn areas, green roofs and sustainable urban drainage systems (SUDS)

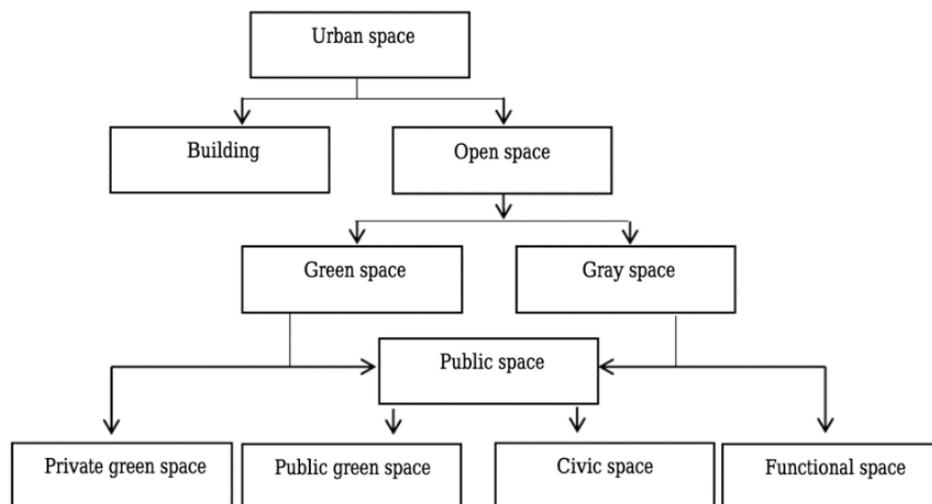


Figure 5. Diagram of spaces in an urban landscape
Source: Mehdi & Ohari, 2017

1.2.3. Ecological and natural corridors

Corridors were legally defined in the U.S. (Ninth U.S. Circuit Court of Appeals (1990), cited in Walker and Craighead (1997)) as: "...avenues along which wide-ranging animals can travel, plants can propagate, genetic interchange can occur, populations can move in response to environmental changes and natural disasters, and threatened species can be replenished from other areas."

The ecological corridor, which is not the same as a biological corridor or an ecological continuum, is a functional zone of a corridor between several natural zones for a group of species reliant on a single environment. This passage associates different populaces and favors the spread and movement of species, just as the re-colonization of environments that have been disturbed.

When passing through cities, the ecological corridors become linear gardens and open spaces shaping greenways that link natural, cultural, recreational and historical resources. There are many recreational activities such as jogging and walking and can be natural corridors in the form of simple paths on the banks of the rivers. These corridors connect many points, such as parks, libraries, schools, and markets, and can play a supporting role in infrastructures such as sewage, railways, walking and walking trails. They have an essential role in protecting natural resources in communities such as rivers, wetlands, wildlife, and floodplains.

1.3. Relationship between the rivers and green areas.

The existence of green spaces is associated with water sources, and rivers are often the main artery of the existence of green areas. In Greater Damascus, The Barada River which is spring from the Anti-Lebanon Mountains 45 km northwest of the city, seeps into the plain and created the oasis city of Damascus. From the earliest times, the inhabitants of the city - Arameans, Greeks, Romans - tamed this river, channeling it into a sophisticated network of streams and canals to irrigate the cultivated oasis and to supply the city's water taps, public baths and courtyard fountains. But, the humanitarian activities have always had an impact on this relationship. They cause imbalance and affect negatively. The pollution in the river streams is a result of the illegal use of waste treatment and excessive use of river water which are a severe threat that reflects the presence of green areas. Therefore, the importance of reducing the consumption of water resources of rivers by scientific methods and the harmonious planning of green spaces with these resources constitute the essence of this relationship.

1.4. Design Standards for Green Spaces in Cities.

1.4.1. The Classification of Green Spaces According to the Planning Level:

1. Green spaces at the national level:

Are spaces with unique attractions that contain natural elements such as mountainous area or natural falls, water springs or sulfur lakes. Its uniqueness can be a special attraction at the international level, such as the Versailles Gardens in France.

2. Green spaces at the regional level:

These areas are often natural spaces that are converted into parks, which are large enough to isolate them from urban areas, usually accompanied by static activities. These areas link open areas to each other at the city or regional level through some natural elements such as watercourses and urban elements such as the main traffic axes.

3. Green spaces at the city level:

The general plan of the city determines the preferred sites for these parks, such as high, low topography or steep slopes that are difficult to construct, in addition to the areas surrounding the water surfaces or mountainous. These spaces play a significant role in the general composition of the city, where the planning and design should consider all the necessary rules and standards to define their entrances, which do not represent obstacles or traffic problems in the region, as well as providing sufficient waiting areas for its visitors.

4. Green spaces at the neighborhood level

Which serve the neighborhood and provide external and internal services to the population. Each garden of this type serves a range of residential communities. It contains a range of green areas, tracks, and playgrounds. Pedestrians play a key role in dividing the park into its main components, as well as connecting it to the adjacent main service center.

1.4.2. The Classification of Green Spaces According to the Purpose of Use:

1. Private Green Spaces:

Such as the inner courtyard of houses, the front garden or the backyard.

2. Semi-Private Green Spaces:

Combining privacy and generality such as the elderly parks, the disabled gardens, hospital gardens, and temples gardens.

3. Public Green Spaces:

Unlimited spaces and sides that integrated with the surrounding environment and met the needs of the visitor such as national and local public parks.

1.4.3. The Classification of Green Spaces According to their Relationship with the Neighborhood:

1. Positive Green Spaces:

The green spaces are oriented outward and open in general; usually, they are far from the center such as public parks that attract visitors.

2. Negative Green Spaces:

The green spaces are closed to the inside and directed to the center and have a specific closed format such as private gardens.

1.5. The Benefits of the green spaces.

The benefits of green spaces can be summarized as three main benefits:

1.5.1. Environmental Benefits:

Green spaces are an incredible benefit to our environment. They filter toxins and dust from the air, they give shade and lower temperatures in urban districts, and they even decrease erosion of soil into our waterways. These are just several particular points of natural advantages that green spaces give.

1. Urban Advantages: More green space within a city's boundaries can improve the urban environment. Among the green space advantages listed in EcoPlanIT Madison: Green Space Goal (UW-Madison Department of Urban and Regional Planning) are:

- helping regulate air quality and climate.
- reducing energy consumption by countering the warming effects of paved surfaces.
- recharging groundwater supplies and protecting lakes and streams from polluted runoff.

2. Water Quality Protection: Appropriate landscape diminishes nitrate filtering from the soil into the water supply and lessens surface water spillover, keeping phosphorus and different toxins out of our waterways and preventing septic system overload.

3. **Reduce Soil Erosion:** A dense cover of plants and mulch holds soil in place, keeping sediment out of lakes, streams, storm drains and roads; and reducing flooding, mudslides and dust storms. (Delf, 2015)
4. **Reduce Heat Buildup:** Trees in a parking garage can lessen nearby heat buildup, decrease spillover and improve evening time cooldowns.
5. **Lower Attic Temperatures:** Trees shading homes can reduce attic temperatures as much as 40 degrees. According to the EPA, urban forests reduce urban air temperatures significantly by shading heat sinks such as buildings and concrete and returning humidity to the air through evaporative cooling (Delf, 2015).
6. **Improving Air Quality:** Trees, shrubs and turf remove smoke, dust and other pollutants from the air. One tree can remove 26 pounds of carbon dioxide from the atmosphere annually, equaling 11,000 miles of car emissions. One study showed that one acre of trees has the ability to remove 13 tons of particles and gases annually, 2,500 square feet of turf absorbs carbon dioxide from the atmosphere and releases enough oxygen for a family of four to breathe (Wolf, K. L. 2004)
7. **Green Roofs cool Urban Hot Spots:** Rooftops totally or partially covered with vegetation can play a critical role in saving energy, decreasing the urban warmth and adding more green space to a built environment.

1.5.2. Cultural and Social Benefits:

Green spaces provide spaces of communication through the home and public gardens and children's playgrounds, leading to family and community ties. They are also an area of comfort and psychological calm for the urban population as well as it stimulates social relations among the population, which strengthens the sense of belonging and familiarity in their areas of residence.

1.5.3. Economic Benefits:

A 1991 study by the Wall Street Journal estimates that an attractive landscape increases the value of a home by an average of 7.5 percent, and reduces the time on the market by five to six weeks. The Wall Street Journal reported that landscape investments are recovered fully, and sometimes doubled, by the increased home value. Psychologist Rachel Kaplan found trees, well-landscaped grounds, and places for taking walks to be among the most important factors considered when individuals chose a place to live. (Delf, 2015) Moreover, nature increases job satisfaction and worker productivity. Employees with an outside view of green spaces experience less job pressure and greater job satisfaction than workers viewing artificial objects or having no outside view; plants provide a sense of rest which allows workers with access to plants and nature to be more productive.

1.5.4. Health Benefits:

Living near the green areas has many health benefits, especially in reducing the spread of mental illness, such landscapes are also currently used by hospices in the treatment of Alzheimer and AIDS patients. In addition to helping reduce psychological stress and control blood pressure and even help to heal after surgeries.

CHAPTER 2

The Urban Formation of Greater Damascus: The Threats of Urbanization on Green Spaces

2.1. Introduction

Damascus city defined as one of the major cities in the Arab Region with historical value as the oldest continuously inhabited cities in the world with tremendous architectural and urban planning heritage. Since the start of a century ago, the old parts of the city (Old Damascus) have turned out to be surrounded by current urban development. The aims were to introduce urban settlement which looked like the urban structures and traditions of the so-called "motherland." The outcome has been a diverse range of urban quarters inside the same city area. The expanding demand for distribution of residential zones in development plans and increased allotment of terrains and funds for associated infrastructure to facilitate a large population is a challenge for any country. This fast growth takes a toll on the environment and living spaces of the city, as urban green spaces, barren and fallow lands, agricultural terrains are being changed over into private buildings, and shopping centers, additionally encroachment of hill slopes and riverbeds by slums have led to degradation of both these habitats.

2.2. Damascus: its Early Formation

Damascus is arranged on a huge plain along the limit of the Anti-Lebanon mountain extend where the River Barada begins. With just a normal of 200mm of precipitation every year, water management has been a critical issue for the advancement of this desert spring city. Given the zone's geography, the city was built up between two threatening zones: the mountain summit, where there is a risk of the river swelling due to its gentle slopes - and the foot of the mountain, where the closeness of the phreatic layer inhibits extensive dense urban development. The site established slightly overhangs the riverbed and constitutes a valley deep enough to contain floods (Arnaud, 2006).

"The city of Damascus started as an important caravan center and lush oasis at the junction of important trade routes, according to ancient Accadian and Egyptian documents. Three major roads led out of the city; the western road led towards Egypt, the southern road led to Mecca, and the eastern road led to Babylon" (Lapidus, 1973).

The first urban form of Damascus began to unfold by the beginning of 3000BC. City walls were built around the settled area with "wide straight streets radiating outward from the concentration of public buildings in the center" (Bonine, 1977, p. 145). However, it was the Hellenic era (336-146 BC) that first actively contributed to the city's

morphological legacy. (Bonine, 1977) Where the grid street patterns, temples, sports stadiums, public baths, theatres, agora, and the porticos were highlighted. As for the Greek period in Syria and their contribution in the development of the city, the figures below show the Greek city which was located within today's Damascus old city walls, the Greek grid road pattern is superimposed on the current road plan of the old city and the location of the Greek temple is today the location of the Umayyad Mosque. Though the roads today are no longer follow the original grid, various studies by French and German scholars have discerned "in the higgledy-piggledy alleys and lanes of the walled city indications of the strict grid plan...Now and then, a lane following the orthography of the grid jumps to the next parallel street. A thoroughfare that once [cut] across the city temporarily ends in a cul-de-sac but resumes after leaping a cluster of family homes" (Burns, 2005).

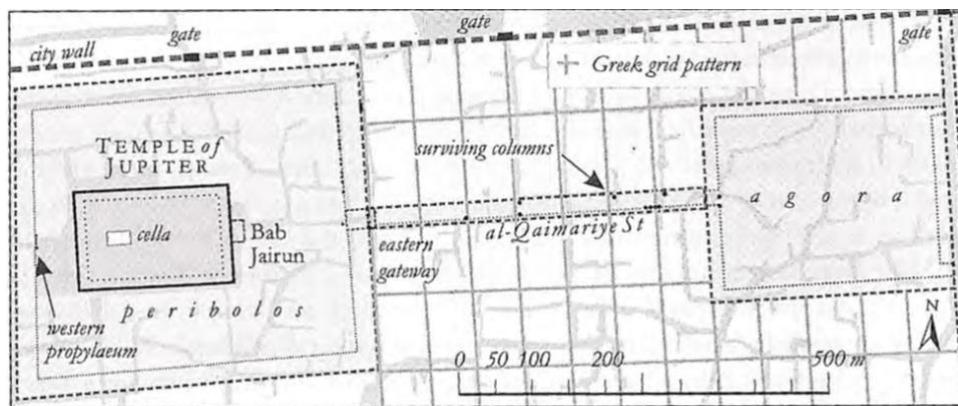


Figure 7. The Greek Temple of Jupiter and Damascus Street Map
Source: Burns, 2005

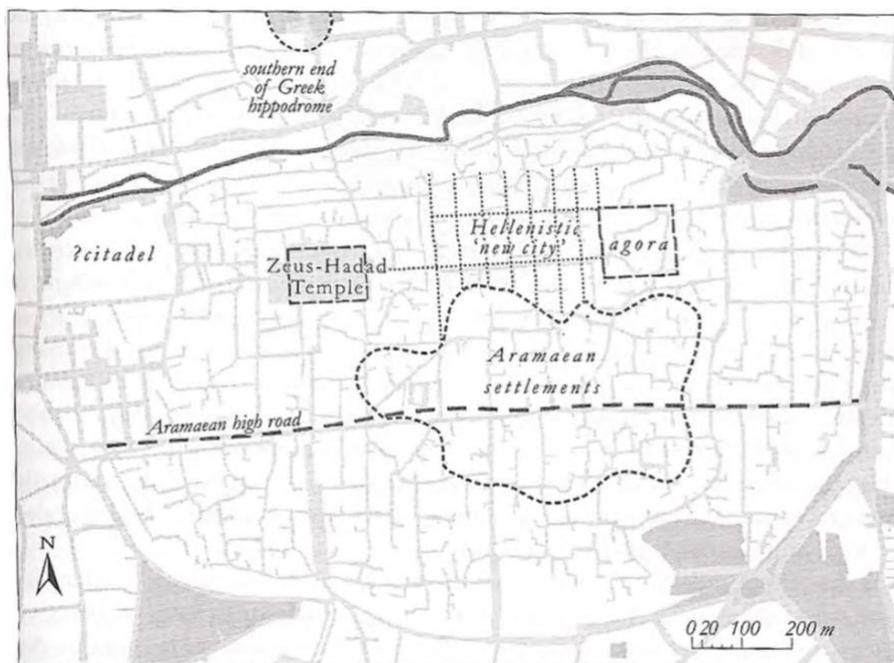


Figure 6. The Greek city located within Today's Damascus old city walls.
Source: Burns, 2005

When Romans arrived, they followed the Greeks in developing the existing cities and building new ones. In 64BC, Syria became a central province of the Roman Empire – take pride in grand cities with famous monuments such as Palmyra, Bosra, and Antioch (in what is now Turkey). Figure 8 shows, the Roman Damascus, which is the same size as the old walled city of today. Via Recta (Straight Rd) remains today, starting from Bab Sharqi (Sharqi Gate) to Bab Al-Jabia (Al-Jabia Gate), the two of the seven gates of the Roman city. The Romans expanded the Greek Temple of Jupiter and the Agora, and as Fig 8 shows, extended the grid system. The Romans also developed the first system of water pipes, remnants of which can still be seen in today's Qanawat district (Burns, 2005).

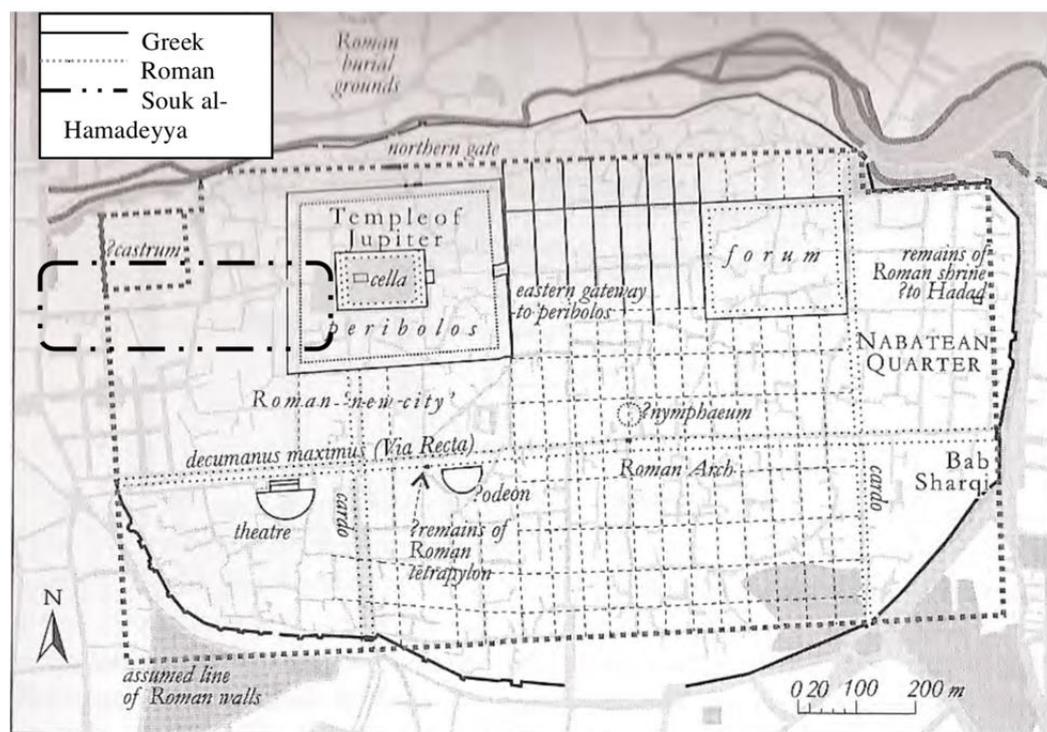


Figure 8. The Roman City of Damascus
Source: Burns, 2005

We can observe that during the early formation of Damascus, the significant focus was given to the development of the infrastructure of the city, which is perfect for developing a city. But there is no mention of having a vision of developing a green city, so with our limited evidence, it is right to conclude that green spaces were sacrificed for the thirst of development of infrastructure of Damascus. This was continued by the Romans also. Now let us take a look in the Islamic rule.

2.3. Damascus under Islamic Rule

In the 7th century, The Middle East Territory saw changes radically, especially where Arab tribes united under the banner of a new religion, Islam. In this period, the Persian Empire vanished under the onslaught, and the Byzantine Empire lost its most valuable provinces. In their place, the Arabs established a vast empire, called the "Caliphate." Under the Umayyad caliphs, the seat of Islamic Power was transferred from the Arabian Peninsula to Syria; Damascus became the capital of an empire that extended from the Atlantic Ocean to the Indus River. The early Islamic community was transformed into a powerful empire. Arabic became the official language and Islam the foremost religion of the diverse lands bound together under Umayyad rule. It is often considered the formative period in Islamic art and architecture regarding the new cultural, social and economic changes in the region.

"Islamic expansion out of the Arabia peninsula brought dramatic changes to the landscape which it inhabited, With the urban system of oasis settlement that bought both of economic transformation with their agricultural products and powerful form of cultural expression" (D. Ruggle, F., 2000)

In 750 AD the grand Umayyad Mosque was complete, built on the site of the Church of St. John (Flood, 1997). Major features of the city that altered during the early Islamic period were the street layout invaded and divided up by intrusive structures, both houses and shops, and became more like narrow winding lanes than the majestic thoroughfares of classical antiquity; and the extensive, open agora, scene for markets and meetings, was gone, the design and scale of bathhouses, and the development of linear, roofed suqs, or markets (Kennedy, 1985, p.4-5).

As Kennedy (1985) describes, every city was provided with city walls for security, a mosque, and supply of running water, essential for the daily ritual of Wadu (a religious ablution, is performed five times a day before Muslim prayers). Furthermore, given the importance of private property in Islam, house proprietors were allowed to construct or broaden their properties, as long as their neighbors were not 'offended.' Hence the association of narrow streets with 'Islamic' cities, as property owners expanded their homes unconstrained. Also, pack animals were the preferred form of transport, with wheeled chariots becoming obsolete in late antiquity, therefore, reducing the need for wide boulevards. These advancements, which are traditionally attributed to 'Islamic' cities, happened slowly, taking many centuries to form (Kennedy, 1985). As Bianca (2000) describes, traditional Islamic cities followed an "organic pattern of growth" (p.31).

In general and especially under the Umayyad rule, the views of Islam were upheld. Hence the importance of private property in Islam preceded the view of protecting the public green spaces. Since we don't have much evidence, we cannot say that this threatened green spaces, but at the same time, did not encourage expanding the green spaces of the city of Damascus.

2.4. Damascus under the Ottoman Empire.

From their inception to the height of their power in the middle of the 16th century, the Ottomans concentrated on religion to unite their diverse issues. Under the Islamic rule, Damascus became the principal meeting place for caravans of pilgrims to Mecca. Hajj was organized very carefully in two caravans, one from Damascus and the other from Cairo, which brought Damascus back to the center of the empire as the Empire expanded, as well as the number of pilgrims, with between 30,000 and 60,000 people gathering in a district of Damascus called Maidan twice a year. Once at the beginning of the journey and the second at the return. In addition to two or three commercial caravans, each one includes about 2,000 camels would stop in Damascus each year, bringing with them goods from the East (China, Japan, India, Baghdad) before completing their journey to Istanbul and Cairo. These trade caravans lasted until the nineteenth century. These migrations added more than 30% of the city's residents during the pilgrimage, and the city's economic and commercial success led to a major shift in the formation of the city with vast expansion in the suburbs. The Maidan area, located south of the Old City, has been fully integrated into the city's urban fabric as a residential suburb and agricultural center. Figure 5 shows the urban expansion of the city of Damascus over time. As shown, dwellings outside the Old City follow the route of the pilgrims southward to Mecca, which delineated the city's expansion and urban development. The initial development of the Maidan district made it crowded with housing, which later expanded to merge with the roads to reach Saliheye. In 1516, extra-muros settlements had totaled 64 hectares; by 1850 it had almost tripled to 184 hectares (Burns, 2005).

As for the Ottomans' administration of land and green areas, they had a special system in land tenure and reform. During the Ottoman Empire, Syria was incorporated into the *Timar* system; an administrative system much like other feudal systems where land belonged to the state and the ruler, with notable families deriving wealth from taxation and feudal estates. Serfs paid "iltizam" taxes proportionate to the size of land cultivated or to the crop (Acun, 2002; Lewis, 1979). "Many peasants, and in some cases whole villages, lost their lands to the notables and turned to sharecrop; others less fortunate, were completely dispossessed and either became wage laborers on the estates of big landowners or fled to small towns and cities" (Khoury, 1983, p.5). Agricultural exploitation, cash cropping, the development of new means of communication and

transportation have stimulated the growth of large landed estates. In the middle of the nineteenth century, the Ottoman Land code of 1858 was introduced as a means of organizing and increasing the collection of taxes by requiring the registration of land ownership and permits for development. Thus, private land ownership was formalized, and by the early twentieth century a powerful group of landowning families had emerged in Syria (Barakat, 1993)

In contrast to the agricultural sector, the role of the Ottoman Empire in the urban economy was limited to the provision (operation and ownership) of public utilities only (water, and later electricity, postal, telephone, etc.) and infrastructure (roads, railways, seaports communication networks, sewers, etc). The urban industries were privately owned, as the state did not own any industrial enterprise.¹

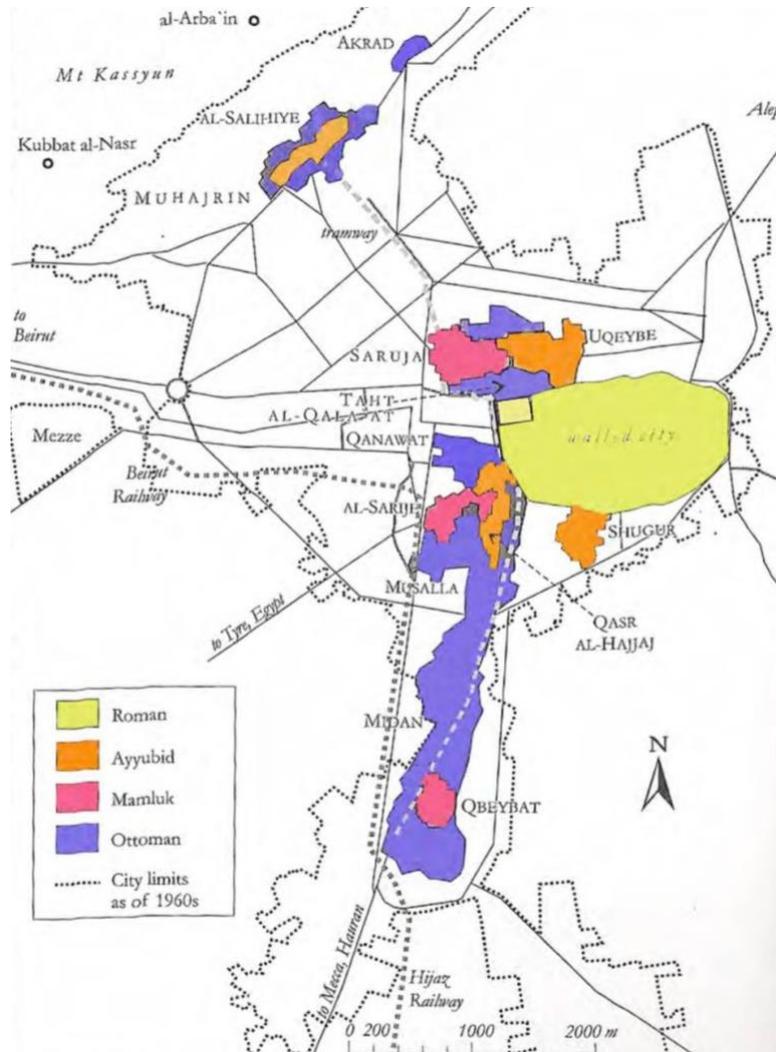


Figure 9. Historical Development of Damascus
Source: Al-Qattan, 2002

1. During the 12th and 13th centuries, Damascus suffered earthquakes, outbreaks of plague, attacks from Crusaders and assaults from raiding Mongols. While the overriding influence of the Mamluks (1260-1515) maintained the Islamic direction of the city, Cairo had become the political and economic centre of the Mamluk Empire, reducing the maintenance of Damascus further.

The last 60 years of Ottoman rule were known as the Tanzimat Period which means "The Reorganisation Period." It was a phase of administrative restructuring and modernization that was focused on urban planning and urban development to accommodate the increased prosperity of European trade. "Damas est touchés par d'importantes transformations, de nouvelles modalités de développement et de modernisation de l'espace urbain se mettent en place" (Arnaud, 2006, p. 9). The urban development that took place during the period of the "Tanzimat" was based on three principles set by Prime Minister Mustafa Rachid Pasha: 1- Expansion of streets and roads and removing dead-ends. 2 - Design of new suburbs with geometric rules. 3 - Construction of buildings in stone instead of wood.

Until the 19th century, Damascus had mostly developed to the south on the right bank of the river. But from 1860 until 1919. The city has grown by 25% in size while the population has doubled, filled the spaces between intra-muros and the Maydan suburb, Saruja, and Aqaba. By the end of the Ottoman Empire, nearly 90% of the land that had been expanded was located on the left side of the river like Qassaa, Arnus and Jisr al Abyad and spreading northwards. (Fries, 2000) and taking advantage of the ease of supply of water through the channels that irrigated the northern region of Al-Ghouta.

By the end of the 19th century, the urban fabric of the city of Damascus became less densely populated due to the city's new residential suburbs, which were organized with large green spaces and wide streets in parallel with the urban development of public parks. As Arnaud (2006) indicated, and contrary to what is common among the general, "the work of town-planners and extensions of the city occurred well before the establishment of the French mandate." In 1894, the first planned residential quarter was established in Damascus. It was the first and only one established by the public authority under the Ottoman rule of the city. Al-Muhajirin was initially built to shelter refugees from the Christian and Muslim majority. The quarter is located on a steep slope near the city center with great views on it and the surrounding areas. The total 45 hectares of this quarter was built above the river, which affected the population because of the lack of access to the water, and as a result, there were no green spaces in this land and therefore cheap for the refugees. The first houses were built in 1896 for refugees from Romania. In 1908, a large reservoir was developed to improve the standard of living, pushing housing prices higher. Al-Muhajarin is an exception in Ottoman urban development: later suburbs that emerged to the north of

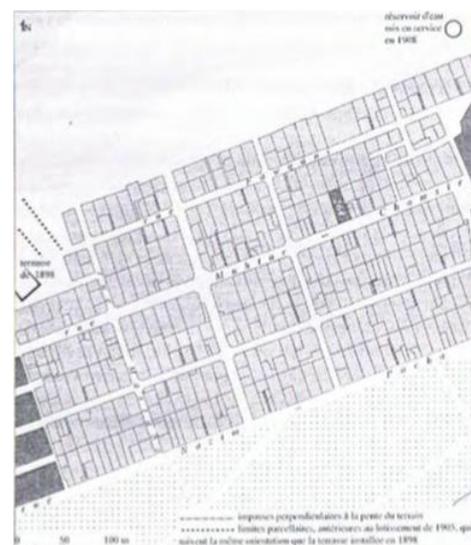


Figure 10. Section of Al-Muhajirin Plan 1945
Source: Arnaud, 2006 p. 174

Damascus were not planned out, with plots rarely taking rectangular shapes as buildings were developed randomly over time; these new suburbs have numerous impasses, with no visible planning – similar to the ancient quarters of the old city (Arnuad, 2006).

However, by the end of the Ottoman rule, Damascus had "multiple manifestations of modernity" (Fries, 2000), bringing three train stations, street lights, electric tram lines, large hotels, theatres, and cafes. The strengthening of trade ties with the West, especially Europe, has led to the establishment of banks and the restoration of old souks, while political reforms have contributed to the construction of new town halls, schools, hospitals and also built the first Syrian university, west of the old city in Al-Baramkeh district.

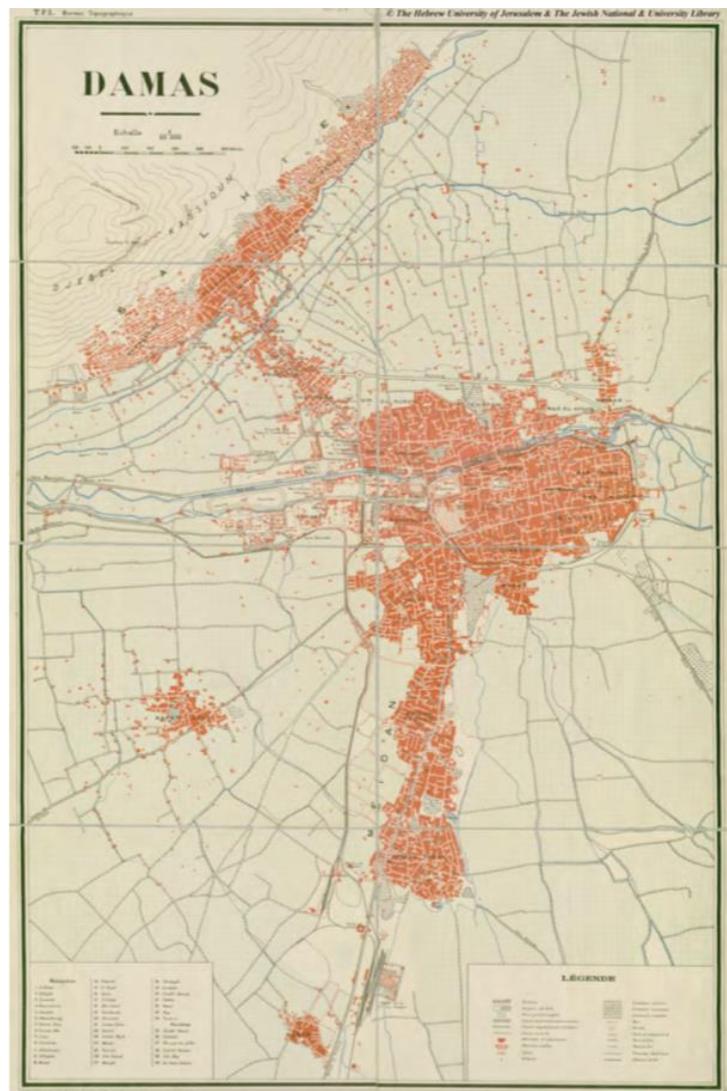


Figure 11. Damascus City 1929

Source : Bureau Topographique des Troupes Francaises du Levant, 1992

While the earlier phases, posed a threat to green spaces through their religious views and linear vision of development, the Ottoman rule posed a threat through its administration. Agricultural lands have encroached since prominent families had a hold on the higher authorities of the empire. When more privatization was encouraged, this led to a decrease in public areas, including green spaces.

2.5. Post-World-War I Damascus – The French Mandate

After the First World War and the end of the Ottoman rule, the French mandate tried to continue urban development in the big cities, especially in Damascus and Aleppo. In addition to a few contributions in other cities, the French architects and urban planners drew up the first master plan of the city which was the first of their kind. The cities that were developed did not respect local traditions and needs. French planners created new suburbs with tree-lined streets, avoiding the old city.

The first master plan for the city of Damascus was prepared in 1935 by a French company led by the renowned urbanist Rene Danger (The city's first formal chief planner during the French mandate), Danger was concerned mostly with questions of hygiene, infrastructure, and embellishment of the city. Although the urban fabric in Damascus underwent radical changes inspired by European models during Ottoman rule, the master plan faced resistance from the city that had followed an organic development path for more than ten centuries before the arrival of the French. In addition, the Ottoman law had stated clearly that the municipality was only responsible for the new developments, leaving the restructuring or improvement of the existing infrastructure to the inhabitants of the city, which hindered projects to improve roads and improve the sewage system of existing infrastructure because of the bureaucracy left by the Ottoman times, which remained itself during the first ten years of French rule with the same recruits and technicians who formed the bureaucratic base (Fries, 2000).

Danger conducted an in-depth study of the city considering the social, economic and historical elements, in order to maintain a stable social economy in Damascus. "Les diverses formes de villes...correspond[ent] a un milieu physiquement, ethnographiquement, socialement et historiquement différent. Toutes ont leur physionomie et leur personnalité propre" (Danger quoted in Fries, 1994, p. 315). A background study like this was important to contextualize urban policies. In other words, Danger and his associates in Damascus did not believe that "one size fits all" as far as urban development went. Danger's plan for Damascus is illustrative. To maintain a stable sociable economy in Damascus in the residential areas, he implemented the notion of a dichotomy that Lucien Vilbert experienced and outlined for French urban (re)development projects in Morocco. He resulted in a racially segregated city with the old city on one side and the modern European city on the other. As for city's transportation system, Danger collaborated with Michel Ecochard, proposed a radio-centric road system, to create a ring road around the old city and the new city to ease congestion problems in the city's central axis and to enable easy access across the town. However, this plan has yet to be put into practice. Another critical area of planning that also bore the burden of the French modernization initiative was land tenure, the

mandate's policies further aggravated the maldistribution of land in Syria by encouraging the growth of private land and facilitating private land grabs for those who cooperated with the mandate. Large areas of land, formerly belonging to the Ottoman Sultan were "sold, leased, or given in the mid-1920s to big landlords and influential persons at low prices" (Keilany, 1980, p.209).

A study conducted by the International Bank for Reconstruction and Development (IBRD) in 1952 showed the status of land tenure. Approximately 50% of the private land has an area of more than 100 hectares. In contrast only 13% of the land that owns in small holdings of 10 hectares or less. Also, the study showed that about 82% of the rural population either had no land or had small plots of land less than 10 hectares (IBRD, 1955). During this period, the first unauthorized urban development began. In 1919, 36% of the houses in Damascus were built without a permit due to a requirement that was introduced in the Ottoman Land code in 1958. Between 1920-1930, the city grew almost 25% – as much as it had done over 50 years previously (Fries, 2000).

The french worsened the situation distributing more private lands across the city. they followed what ottoman administration left after the war. Moreover, their racial segregation led to sheer ignorance of the suburbs, where the remaining green spaces existed. This eventually led to the disintegration of green spaces.

2.6. Damascus after independence: Urban Change and Ecological Imbalance

After the independence of Syria in 1946, Damascus quickly developed as the capital of the Republic. Its population increased significantly from 423,000 in 1955 to 3 million in 1980, due to two main reasons explained by Al-Haj (2019): " First, rural-urban migration from all over the country as a result of the central policy of the country. Second, the influx of Palestinian and Syrian refugees from Palestine and the Golan Heights." Furthermore, high tariffs and high costs of internal trade, with low levels of foreign trade at that time, played a major role in the urban concentration. (Ades and Glaeser, 1995). According to World Bank statistics, Syria has one of the highest population growth rates in the world at an annual rate of 3% due to increased agricultural mechanization and increased rural unemployment (El- Laithy & Abu-Ismaïl, 2005). This high rate of population growth (3% per annum) is much higher than the global and Arab average when compared to other Arab countries, and with high unemployment, helped the emergence and growth of illegal settlements in the same proportion (3% per annum) (UN HABITAT, 2001)

Figure 12 shows the rapid urban growth of the city after 1960, at the expense of the city's green spaces, especially on its surrounding Ghouta oasis. Damascus has coexisted with its surrounding oasis for thousands of years. The Barada River was a precious source of water in a city that has a precipitation rate no more than 200 mm per year, but with the influx of rural and neighboring villages and uncontrolled urban growth, the ecological balance between the city and the oasis sharing the same water resources began facing serious difficulties.

“In the cities of developing countries, the environmental problems are much greater, because of the overwhelming scale and speed of urbanization. Apart from the effects on health and well-being, environmental degradation constrains development and the growth of cities themselves” (Atash, 2007, p. 399).

After the land reform that happened in Syria, many owners of agricultural land in Al-Ghouta, who are in a bad financial situation, found an opportunity for them to sell their property to new immigrants to build their own houses cheaply on it, that led to the encroach on the Ghouta and the destruction of the canal networks. This put unprecedented pressure on the water supply. In response to these developments, the ministerial decree of 1977 banned further construction of houses in Al-Ghouta area in an official attempt by the government to protect the remaining green spaces. However, as the government did not take any measures to restrict the migratory movement, which was the principal cause, the growth of illegal settlements continued as the city continued to expand at the expense of agricultural lands which formed the lung of Damascus for centuries, Al-Ghouta.

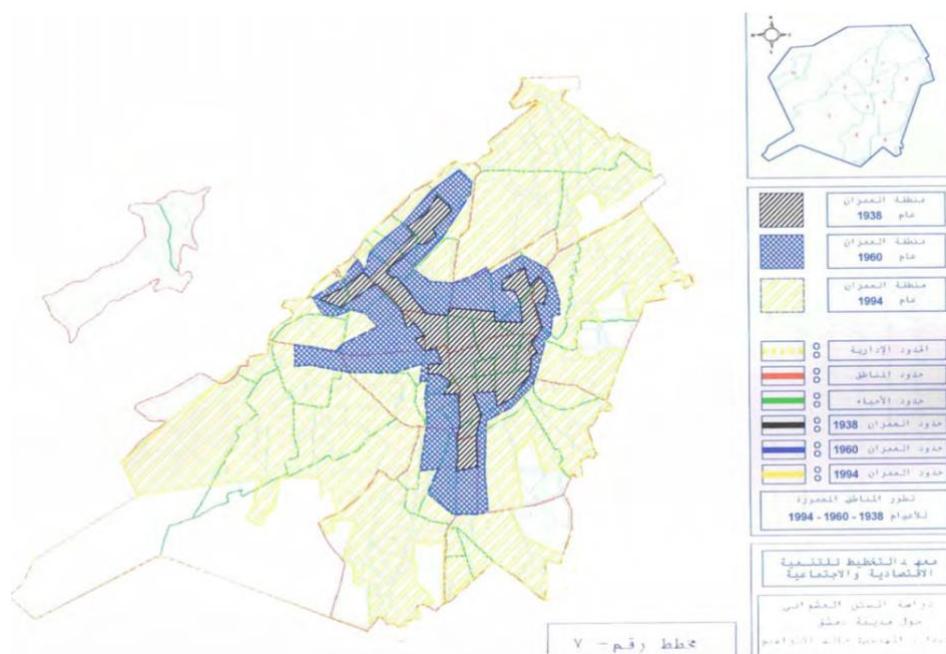


Figure 12. The Growth of Damascus 1938-1994

Source: El-Ibrahim, 2001. Page 80

The Ecological imbalance of the city:

The rapid industrialization policy since the 1960s has led to an increase in environmental recklessness and ecological imbalance; the massive population growth has had a significant impact on the natural resources of the city, which has contributed significantly to the decline in green areas.

I. Water Resources:

1. Barada River:

Damascus is well known for its fertile soil and the Al Ghutah Oasis that was historically fed by the Barada River and associated channels. The legacy of this oasis can still be seen around the city with mature trees lining public roads and surviving well with no formal irrigation system. Two main water resources are present within the area: groundwater within the underlying aquifer and surface water from the Barada River.

As for the city's surface water hydrology, The Barada River is originating from the Barada Spring located in the Anti-Lebanon Mountains to the west of Damascus. Several smaller rivers branch from the Barada River towards the base of the mountains and supply the historic Al Ghutah Oasis which surrounds Damascus. One of these smaller branches, known as the Banyas. Flows of up to 14 cubic meters per second have been recorded within the Barada River during the wet season. Although a large flow, when considering the width of the Barada it is expected that this flow will be relatively slow moving and well within the River capacity. During the dry season, the Barada River is often dry and only carries flow from industrial and foul discharges, many of which are illegal. These discharges lead to deterioration of the water quality within the River which consequently reduces its ecological and recreational value. Concentrations of biological oxygen demand (BOD), suspended solids and ammonia exceed Syrian standards.

The Syrian Ministry of State for Environmental Affairs indicated that the urban and industrial expansion, which gradually extended to Al Ghouta and occupied 70% of the orchards and green forests, reduced the level of the surface water of the Barada River and contaminated it with nitrates and microbial contaminants which later reach groundwater. The accumulation of waste generated from the residues of these factories has also had a great impact, which is scattered by the influence of the wind, which causes pollution of the entire area and causes damage to crops. Though the government response to this problem was by the construction of the sewage treatment plant in Adra, The Ministry of State for Environmental Affairs explained that the untreated water of many informal settlements in the Barada and al-Auja basins is still being dumped in rivers and waterways that end up as polluted water in Al-Ghouta and

harm its soil and plants where there are approximately 203 thousand cubic meters per day of contaminated water carrying with it more than 91 tons of contaminated organic load daily and an amount of 122 tons per day of suspended solids. In a study conducted by ACSAD Center in 2013 on the soil in the eastern region of Damascus (Eastern Al-Ghouta), a comparison was made between the areas near Damascus by dividing the ground. The results showed that the pollutants present in the soil are due to the fabric and paints factories and the group of the distributed laboratories such as the plastic labs while the oils found in the soil were as a result of car repair workshops spread along the river Barada, which led to the pollution of the surrounding areas of the river and contamination of groundwater directly through irregular and conventional wells which do not meet the technical conditions.

2. The City's Groundwater

Groundwater is primarily recharged through surface water infiltration from the Barada River and associated branches, although the culverting of the Barada River and its branches may have significantly altered these natural processes. Groundwater resources within Damascus (and Syria as a whole) are reported to have markedly reduced in recent years due to over-abstraction caused by a growing population and industrial and agricultural activity. The Ministry of Local Administration and Environment states that Syria may be faced with a water deficit in the Barada Basin if abstraction continues to increase and dry seasons persist. A reduction in groundwater resources will have an impact on drinking water availability, agriculture, groundwater quality, and increased costs due to increased pumping and treatment required to obtain drinking water quality standards.

Groundwater quality deterioration has occurred as a result of wastewater infiltration, with levels of pathogens and nitrates reported to exceed Syrian drinking water standards. The daily average discharge from the tanning industry in Damascus to the Barada and Dai'ani rivers is estimated at 1100 cubic meters per day; there are also many sewage lines that have not been connected to the public sewer to Adra Station. Moreover, many rural, urban and industrialized areas are not provided with wastewater collection or solid waste management facilities and unauthorized disposal and discharge consequently lead to pollution of groundwater. Inadequate quality sewerage systems also contribute through the leakage of wastewater, which ends irrigating the agricultural lands and green spaces. Studies of the Ministry of Housing have shown that to solve the problem of high nitrate levels in the groundwater in Al-Ghouta, it is necessary to tighten the monitoring of the use of nitrogen fertilizers and the establishment of purification plants and work to find new water sources and prevent the uncontrolled and unauthorized drilling of wells, noting that the number of wells in the countryside of Damascus about 1600 wells and about 220 of which are polluted.

As a conclusion, today, Al Ghouta and the agricultural areas suffer from the decline in the level of annual rainfall and the drought of some water resources, especially the branches of the Barada River, in addition to the risk of health pollution that threatens Al-Gouta as a result of the transformation of many land to restaurants, cafes, factories and factories, in addition to environmental pollution caused by water from factories.

II. Rainfall

Damascus lies within the Barada –Awaj Basin, so called because of the two main rivers which pass through this region. Annual rainfall within the Basin ranges significantly from approximately 400mm in the Anti-Lebanon Mountains to the west of Damascus, to less than 150mm in the lower desert areas to the east of Damascus. Within Damascus city, the total annual rainfall is approximately 180mm, the majority of which falls between November and February inclusive. The summer months are arid with little to no rain between June and August. Annual rainfall data for the period 1918 – 2003 has been obtained from the Ministry of Irrigation in Syria. Investigations by the Ministry of Irrigation show cyclical patterns in rainfall: short climatic rotations occur every four years within which one year is particularly dry; and longer climatic rotations occurring every ten years, within which one year is particularly wet. A gradual decline in average annual rainfall has also been noted, reducing by approximately 50mm over the past 80 years. If current trends persist, in 2035 annual rainfall will be approximately 165mm and in 2060 annual rainfall will be approximately 150mm.

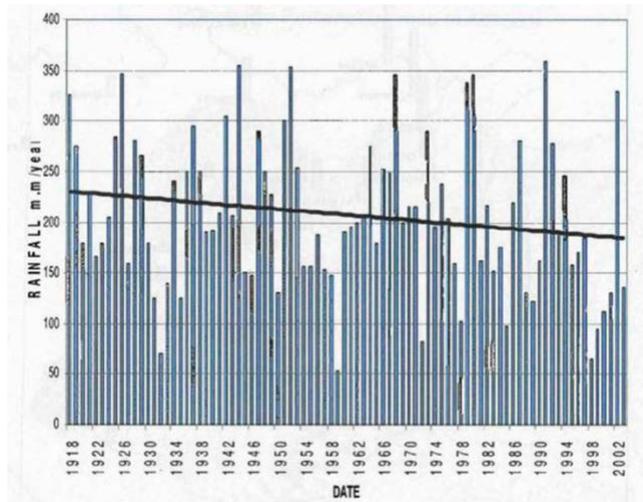


Figure 13. Historic Rainfall Monitoring Data for Damascus City
Source: Ministry of Irrigation, 2013

III. Solar and wind Analysis

Temperatures within Damascus range significantly throughout the year. In the winter months, December to February, temperatures drop to less than 10°C and frosts have been noted, whereas in the summer months, June to August, temperatures are often rise to between 30 and 40°C. Evaporation is also high in the summer months, reaching approximately 160mm per month. In the winter, evaporation drops to approximately 15mm per month. However, Damascus is extremely affected by the climate change, Researchers found that between 1961 and 1990, precipitation during the winter had dropped by approximately 11%, and by approximately 8% during the spring. This drop-in precipitation is expected to continue, and between 2070 and 2099 the rate will likely be 22%, with an annual mean temperature increase of 4°C (Smiatek, 2013).

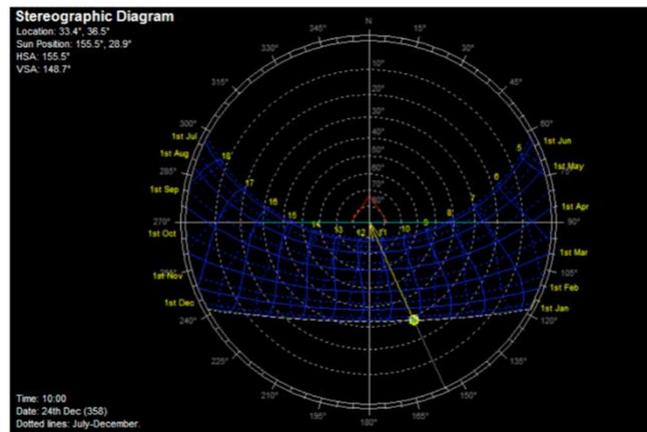


Figure 14. Solar Data Analysis
Source: Damascus Government, 2013

Wind data for Damascus shows a strongly dominant west to the southwesterly wind. This wind is predominant through the year, with nighttime winter wind temperatures dropping to possibly 5-10 degrees or slightly colder. Summer temperatures winds are far warmer up to 25-35 degrees on occasions. The northerly winds noted on the charts are typically far more cooling throughout the year.

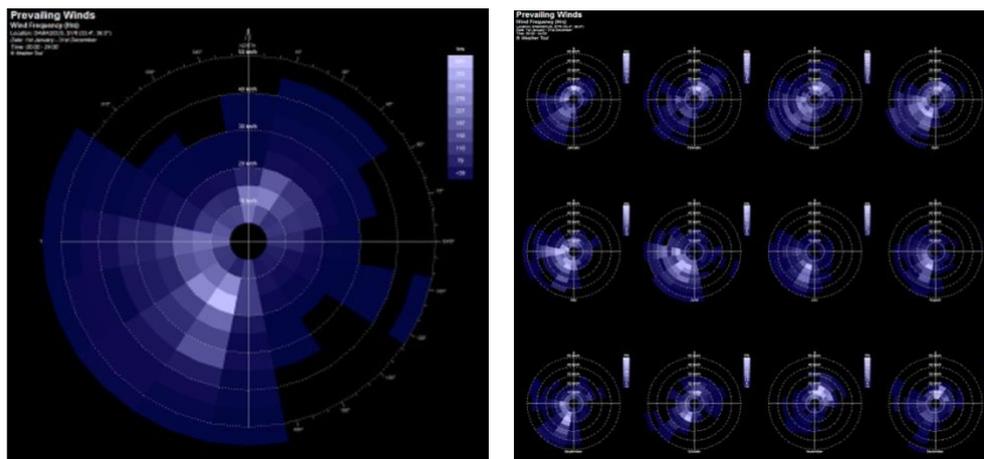


Figure 15. Wind Data Analysis
Source: Damascus Government, 2013

2.7. Conclusion

The reduction and threat to green spaces in Damascus is not a recent problem. This started in the early development of the city, with a poor short term vision and the events that followed worsened the situation. The administration of the Ottoman empire and mandate also has not been kind to green spaces, where the French ignored the existing spaces which led to their deterioration. The post-independence period witnessed a surge in population and the government silence on illegal settlement paved the way for the nearly complete destruction of green areas. This deterioration worsened with the city's ecological imbalance which increased by the population growth and unplanned urbanization in recent decades.

CHAPTER 3

Damascus Today: Unplanned Urban Growth in Damascus and its impact on the city's green Spaces

3.1. Introduction

According to official statistics of land tenure in Syria, owner-occupation represented over 88% of households in Damascus in 2003-2004 which is a very high percentage by international standards². This is due to the encouragement of private ownership of lands and real estates after independence, as a measure of wealth. This statistic led to the lack of plans for social housing by the Syrian government and the absence of any social housing system at that time. Meanwhile, the concentration of government agencies and considerable enterprises in Damascus led to the creation of enormous employment opportunities and thus to the increase of internal migration; individuals created a rural exodus to cities in search of job opportunities. As a result, poor immigrants and refugees came from Palestine, Iraq and surrounded cities to Damascus have had to create their own homes informally. In 2004 about 40% of the population of the city – around 1.3 million of a total of 3 million – lived in informal settlements defined in Syria as “zones of collective contravention” (Presidency of the Syrian Council of Ministers). Today, illegal housing settlements in the form of Slums account for one in three residences in Damascus, especially in its countryside (Rif Dimashq) and are one of the main reasons for the destruction of Al- Ghouta. (Regional Planning Commission, 2019).

3.2. Contemporary Damascus: Illegal Housing Settlements

The development of slums in the cities of the Syrian Arab Republic is one of two elements. The deferral of urban planning on the occupation of the space leading to the maintenance and densification of pre-existing slums and new settlements on unhealthy sites in the peripheries. There are additionally the impacts of the residential strategies of the poorest to access the resources of the city: to reduce the expenses of mobility; they settle as much as possible in the vicinity of the city centers; the rapid urban expansion of Syria's larger cities at the beginning of the twentieth century.

² In 2003, an average of 73.5% of all households were owner occupied in the EU15. In stark contrast to Syria, many countries of the EU15 have a long-established welfare system, reducing the 'necessity' of owner occupation; the state can be relied on for a safety net (EUROSTAT, 2008)

Other factors contributed mainly to this, as Al-Haj (2019) explains: "Though there is no percentage showing the rate of increase in irregular urban growth, it's not related only to the increase of the population and the internal movement of Syrians but was mainly caused by the crises that hit the neighboring countries and started by the displacement of Palestinian refugees and temporary building permits granted by the General Commission for Refugees with the consent of the Syrian government at the time."

Rif Dimashq Governorate (Rural Damascus Governorate) is one of the most affected governorates of slums. It surrounds the province of Damascus from all sides and partly forming with it the Greater Damascus. It covered a total area of 29000 square kilometers (10% of the total area of the country) and ranked sixth in terms of area in the country. Rif Dimashq Governorate is considered as one of the governorates that enjoy the advantages of urban attractions due to its proximity to the capital. It embraces the population surplus from the city of Damascus and other provinces. In Rif Dimashq, there are no more than 70% of the buildings in a good and organized form, and 30% are in the way of slums. These slums extend over a total area of 2996 hectares with a population of 854,200 people distributed in and outside the organizational areas of the rural towns, and on the outskirts of the organized territory of the city of Damascus, especially in the south and south-west, where the largest region in the Al-Ghouta is located, 2996 hectares, equivalent to about 94% of the area of slums observed in the countryside of Damascus.

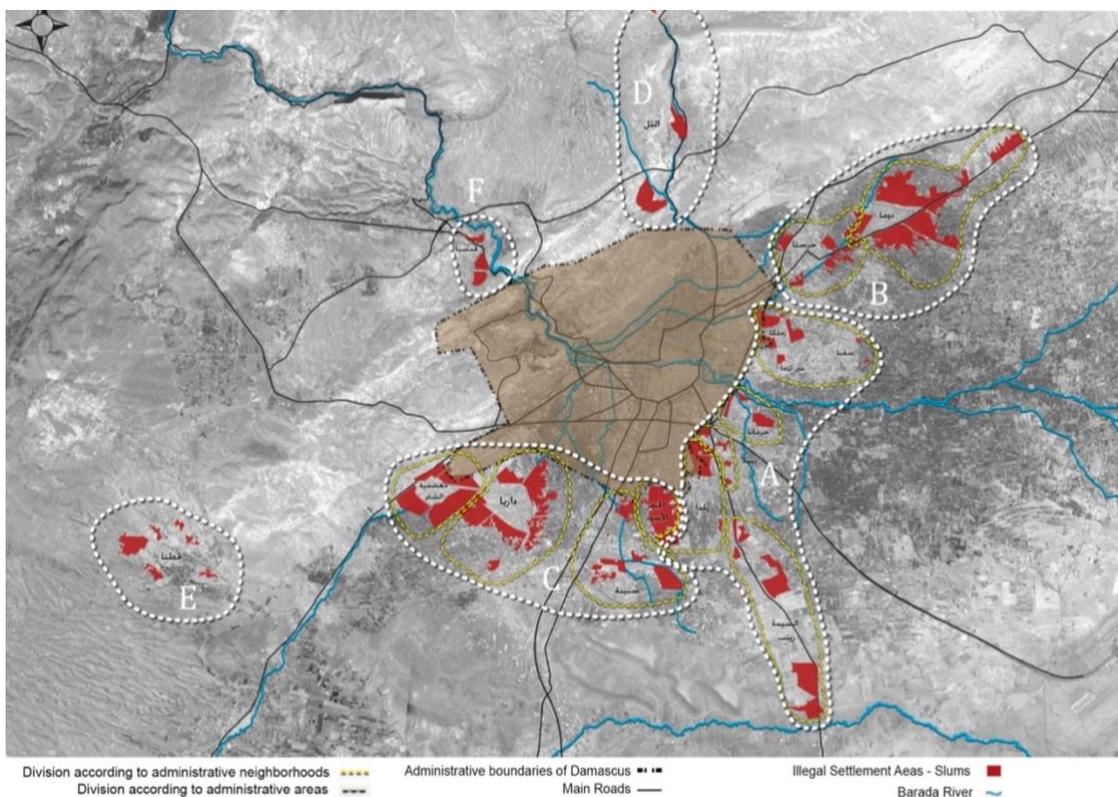


Figure 16. Distribution of the Illegal Settlements in Greater Damascus

Source: Regional Planning Commission (2013)

Despite their occupation of large tracts of agricultural lands, Syrians have the right to preserve their houses if their roofs are built of cement, resulting in the existence of many informal construction sectors that build houses in a period not exceeding four days. (Oxford Business Group, 2006, p.86). These assemblies have developed in different periods of time and differ significantly in terms of urban features, population density, occupancy rates and propagation, while most of them have developed into self-sustaining neighborhoods with a full range of services required for their residents from grocery stores, butchers, laundry shops, shops for electrical appliances and maintenance to medical centers. Thanks to the policy of integration, equipment, and upgrading (though not necessarily legalization) applied mainly during the 1980s and 1990s [Sakkal 1998, al-Baridi 2005]. In 2004, almost 97% of the illegal settlements in Damascus had running water; rubbish was collected, and most streets were tarred (Al-Dayiri, 2007) However, in many of these settlements there was difficulty in reaching some areas, so that the water delivery was not around the clock while the public places especially public parks were utterly absent. Figure 16 illustrates these clusters and is divided into six zones according to the administrative divisions of the regions.

Just before the beginning of the country's war, a large number of the residents of these areas were middle-class families. Moreover, a large proportion of them are not recent refugees or immigrants but are residents who moved from the center of the city (Damascus) due to their financial conditions and to find a cheaper accommodation after the considerable rise in property prices in the capital Damascus. However, the illegal city's settlements were characterized by their urban pattern and land tenure. Despite of its national definition, there were two main types of land tenure: the first type was for some of the settlements inhabited by the initial inhabitants on land that initially belonged to public ownership, mainly the case with public lands and zones on the slopes of Qassion Mountain, which is classified as illegal construction and occupation of the land. The second type is for other settlements which are built on privately owned land,

though legally held by its occupants but not licensed for construction (since they are classified as agricultural land, the case of Al-Ghouta) (V.Clerc, 2015).



Figure 17. The Illegal Urban Sprawl on the preserved green spaces of the city of Damascus
Source: Author

The irregular and unsustainable extension of the city has caused the destruction of urban green areas and resulted from the increasing demand for land. Urban green spaces are an integral part of any city landscape, providing city and its residents with numerous benefits both tangible and in-tangible ecosystem services like pollutant sequestration and ambient temperature regulation, social services, health and also commercial services like tourism, increased property prices, etc. But it is ironic that despite realizing the numerous benefits availed by green spaces in an urban ecosystem, yet vegetation is undergoing degradation and destruction due to rapid and haphazard urbanization in Al-Ghouta.

Moreover, the discharge of high loads of domestic waste and wastewater, the release of high loads of industrial waste and sewage in the Barada river and excessive and irregular using of fertilizer and pesticides by farmers have a tremendous impact on the agricultural areas in East and West Al-Ghouta. However, the effects of depletion are not direct. But the pollution acts as an indirect variable affecting the remaining of Green Areas. Thus, pollution of the Barada river can play as a dependent variable in the study of the effects of urbanization in Green Areas of Damascus.

Though, since the first decade of the new millennium, the government has been working to address urban policies at the local and national levels. The legislation dealing with urban planning and housing has been amended and the treatment of informal settlements has become a central issue through two main possibilities under consideration: upgrading (with regulation) or urban renewal (demolition and legal reconstruction). As the war suspended progress after 2011, with many urban policies still in development and few completed. The war has greatly affected urban dynamics: foreign investment dried up; however, monetary and inflation risks initially boosted construction and as of the very first weeks, informal settlements expanded rapidly (V.Clerc, 2015).

3.3. The Role of the National Urban Policies

At the beginning of the second millennium, the legislative system dealing with urban policies and housing was reformed. New urban policies were adopted to liberalize the economy while maintaining safety (net of social protection) with a focus on investment in real estate: restrictions on rents have been lifted, tourism investments boosted and property law and building permits reformed. These amendments were accompanied by high interest and a return to the construction of social housing by the government (Public Establishment for Housing and Military Housing Establishment, the two main governmental producers of social housing) to accommodate low income families and young people seeking shelter accommodation, which were the main factors in the problem of urban expansion in form of informal settlements.

These huge steps have contributed to addressing the issue of informal housing to a certain extent which reached its highest level in 2000 since 1975 and encouraged the public to acquire private legal houses. By 2007, the annual production of housing units in the metropolitan area had been multiplied by seven, and in the suburbs of the capital by fifteen (Syrian Center for Statistic and Research, 2001 -2010).

However, many of these houses remained empty or incomplete. The main reason for this was giving the governmental and vital projects the great importance to construction, while the construction of social housing was of minor importance and took the form of long-term investment, which made it impossible to cover the increasing demand for these units by low-income families. "Of the 57,000 units that had been planned for the Damascus area since the year 2000, while by 2009 only a few more than 3000 had been completed; on 16,000 of these works was still in progress" (Clerc and Hurault 2010).



Figure 18. A street view from the informal settlements in Mazza 86 Area
Source: Author, 2013

This has led low-income families to continue to build their illegal houses and occupy more green areas of the city. As a response, several laws and legislative was issued between 2008 and 2012 to revive the projects related to social housing by allowing private sector companies to work in this area and provide the necessary facilities for them, but, there has been no significant shift in the indicators of development in this issue in that period.

In 2009, Damascus Governorate revived a project to review the master plan of the city of Damascus (which was drawn up by the planners M. Ecochard and G. Banshoya in 1968) to contain the situation, develop and organize the current areas and develop a vision for the future of the city while the Rif Dimashq Governorate (Rural Damascus Governorate) has launched studies to produce a regional blueprint, but the beginning of the Syrian war in 2011 prevented the achievement of the final goal. The strategy in planning has two main directions: the first is the demolition and reconstruction of the neighborhood and the second is to maintain it and develop its infrastructure. At that time, official planning agencies were drawing up detailed plans for the reconstruction of the areas to be demolished and other plans to provide infrastructure for other areas. The new policies in 2003 stipulated the demolition of all buildings that violate the regulations, while the 2008 law provided for severe penalties for persons involved in any way in unlicensed construction, but at the same time enabled the consolidation of neighborhoods built before 2003 and compatible with the new master plan of the city.

The Ministry of Local Administration and the Environment which is the local administration responsible for urban planning since 2004 have contributed to many programs that lead to the upgrading of the slums and many laws (33/2008; 46/2004) have been created with the Regional Planning Commission which was established in 2010 for the development of informal settlements and rehabilitation. (Government of Syria, 2010). At the same time, the Ministry of Housing and Construction, in cooperation with the Public Establishment for Housing, defined and established the legal conditions and administrative regulations governing the urban renewal policy of informal settlements, providing private investors with publicly owned land on which housing for low-income households was to be built.

The regulations didn't mention the minimum percentages of green areas required in these areas, at a time when private sector investors were interested in how to achieve higher returns even at the expense of green spaces. "There are no solutions without sacrifices, Damascus governorate is completely surrounded by agricultural land and any expansion to contain the population inflation of the capital will be exclusively at the expense of these green lands" Al-Haj (2019).

By the beginning of the first decade of the twentieth century, Damascus Governorate has developed detailed urban plans for informal areas by urban planners and consultants in 17 urban areas identified by the governorate. These urban areas were accompanied by a conflict between the economic logic of investment to achieve a profitable return and the logic of social welfare by providing the necessary social and health services like facilities and green spaces.

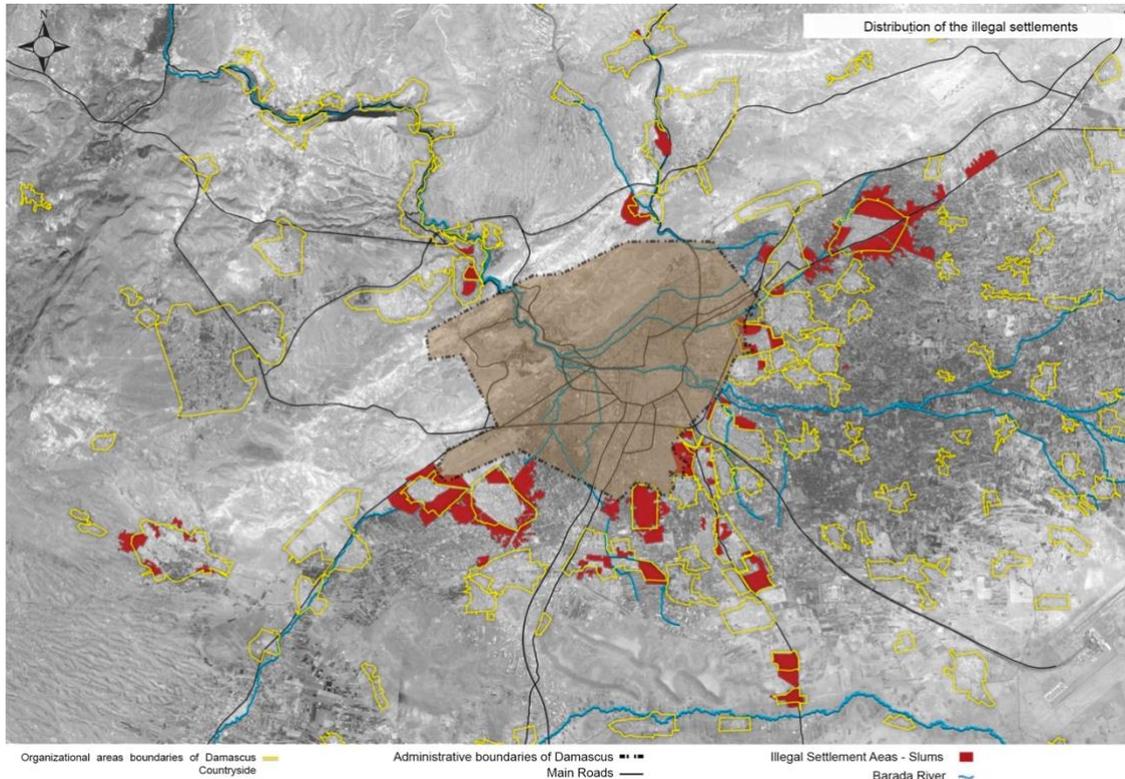


Figure 19. New Developed Urban Boundaries for Illegal Settlement Areas

Source: Regional Planning Commission (2013)

3.4. Acceleration of the Informal Urbanization with the Start of Syria's War

From the early beginning of the war in Syria, illegal construction flourished again and violations extended to the regular areas, due to the increase in construction costs in irregular areas. With the absence of any precise survey, these violations can clearly be noticed by the comparison of satellite images for the development of these settlements and by the constructors themselves which worked in the areas concerned. According to the latest estimates, the rate of construction of illegal settlements in irregular areas increased by 15% during the first three years of the war. This increase is in line with the rise in cement sales during the period, which reached 115% during the first month of the war (March - April 2011) according to the records of the General Organization for Cement and Building Materials (the authority supervising the production of cement and construction materials by State-owned companies). This was in parallel with the rise in the prices of materials and labour, benefiting from the preoccupation of public authorities in the ongoing war and avoid an open conflict between the police and the population, and in an attempt to prevent this, the government requested the General Organization for Cement and Building Materials to demand building permits before the sale of cement to its customers. However, the trend continued nonetheless.

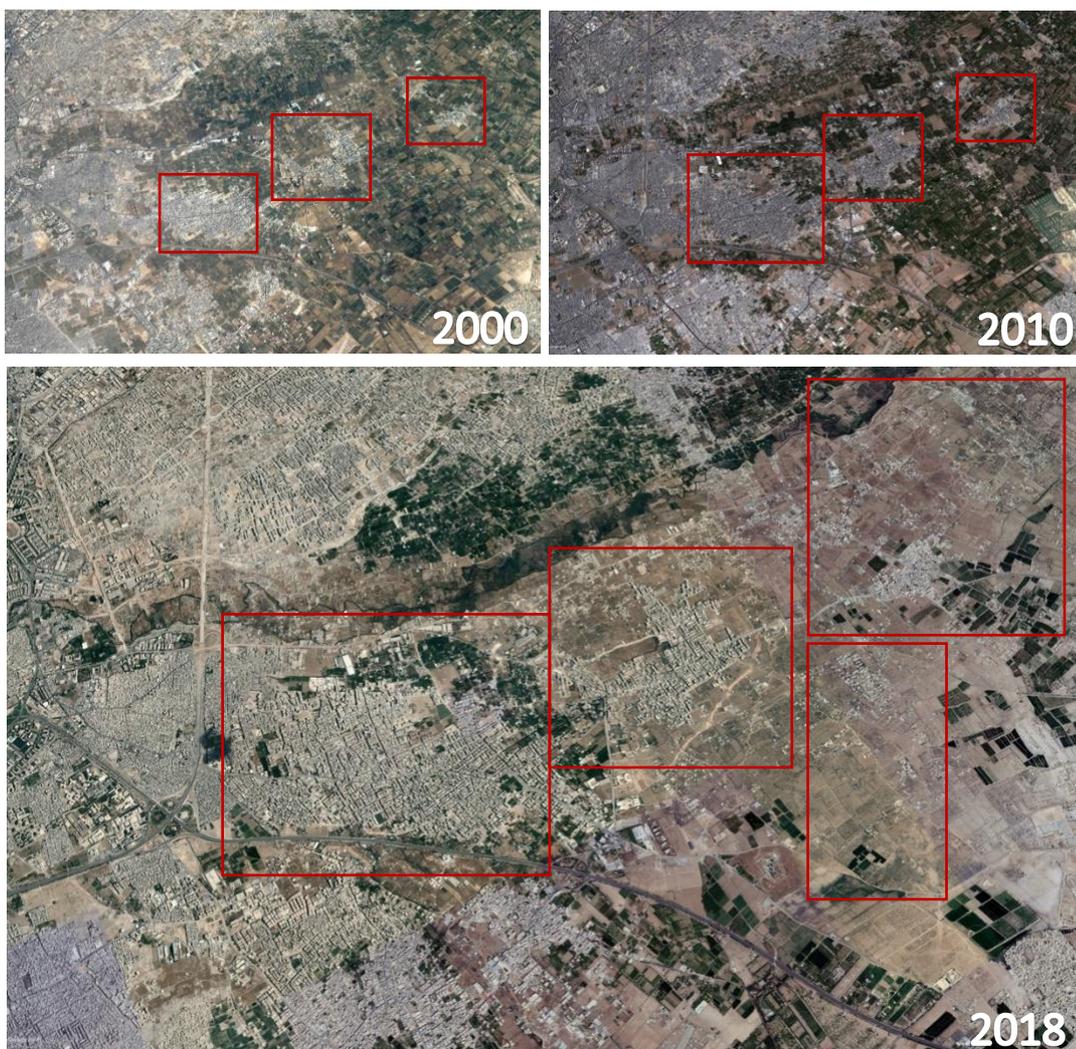


Figure 20. The illegal Settlements Growth in Al-Mleha, Damascus between 2000 and 2018
Source: Google Earth

The Syrian war has frozen the work of all international cooperation projects. With the beginning of the spring of 2011, all European experts left the country, including Arab experts from the Lebanese engineering consultancy Khatib and Alami, which was responsible for drawing up and developing the master plan of Damascus. As a result, all the projects that were still under preparation were frozen, as the European Investment Bank (EIB) and the French Institution for Cooperation and Aid (AFD) did for the MAM urban project to upgrade the informal settlements in Syria.

However, with the cessation of international cooperation programs with the Western countries, the Syrian government moved eastward and made several agreements with Iran to reactivate cooperation in the fields of housing, construction, and urban planning. And in an attempt to prevent any more increase of the informal settlements, the programs and plans of the Syrian government continued through local teams the efforts that have already been started. The Regional Planning Commission worked on defining the classification of neighborhoods and developed preliminary plans in parallel with the announcement of the establishment of a public authority and fund for development and upgrading of informal housing areas by the beginning of 2012.

Even more, the studies of the Master Plan of Damascus Governorate and the Regional Planning of Damascus countryside continued and some detailed reviews were relaunched targeting the informal settlements in Mount Qasioun to upgrade them in parallel with an attempt to accelerate the production of subsidized housing through the involvement of the private sectors. In March 2012, the governor announced an option to legalize the large majority of informal settlements. In May 2012, he announced that all the neighborhoods are awaiting upgrading or legalization, with the exception of some areas that will be renovated in the city center, especially those surrounding the future railway stations and near major urban institutions such as Presidency of Council of Ministers.

3.5. The Situation of Informal Settlements in the Midst of Syria's War.

By the beginning of 2013, massive demolition of the urban environment started in the informal settlement's zones, which had been taken by rebels opposing the government as a center for them due to its proximity to the center of the Syrian capital. Armed battles and military operations were witnessed, in which most neighborhoods were destroyed. Since then, government interventions and urban strategies have changed in these zones after the devastating war; many decisions were made to compensate the victims of these settlements in preparation for reconstruction. The authorities also considered urban planning as an opportunity to reorganize these neighborhoods, which was an urban problem suffered by Syria for decades, but this time with bigger challenges. A large proportion of the public spaces and basic services (water, sanitation and sanitation) that the government has been providing for these neighborhoods over the past decades were in no small extent destroyed, which has exacerbated the difficulties already existing, in parallel with the existence of a very large number of housing units completely destroyed. In May 2013, an estimation conducted by the United Nations, working through the UN Economic Commission for Western Asia (ESCWA) shows that almost a third of housing units, i.e., 1.2 million, had been affected by the conflict. In 2015, The Syrian Center for Policy Research (SCPR) and UNDP report estimated the destruction of physical infrastructure at around \$67.3 billion (SCPR, 2015).



Figure 21. Satellite Image Showing the Extent of Destruction in Informal Settlements Areas in Jobar District in Damascus.

Source: Google Earth, 2019

As a result, more than 1.2 refugees and 4.25 million internally displaced persons have left their homes (about 1.1 million housing units nationwide). In Damascus, most of them located in the agricultural areas of Eastern Al-Ghouta and the informal areas in the south and south-east (Damascus Government, 2018). This led to more challenges not only for the government but even for the big cities which accommodate the significant number of people which displaced from its suburbs. At the local levels, since 2012, the government's strategies and plans were to reconstruct the affected zones and prepare them for the refugees' return, the governments' priorities were limited to emergency services and to rebuild the destroyed infrastructures (electrical and hydraulic networks, solid waste, sanitation, medical and educational facilities, police). While the plans at the national level were to reorganizing the government administrations which led to set up the Ministry of Public Works and Housing in 2016, to be responsible not only for housing and public housing but also for urban planning along with the Regional Planning Commission, though, the new Ministry's tasks were handled before by the Ministry of Public Works and the Ministry of Housing and Urban Development, the legislation and regulations passed and reorganized to provide a better framework for immediate response for investment, enable mortgage funding and to authorize the establishment of companies to finance and refinance the real estate projects.

3.6. The Politics of Urban Reconstruction in Syria.

On the second of April 2018, the Syrian government issued law no. Ten which allows people's disempowerment through regeneration Master Plans for the informal settlements areas inside Syria. When the Syrian Ministry of Local Administration selects an area for reconstruction, the owner of any property in that area loses their status automatically as the sole owner; so they cannot sell, give or even build anything there, they can only use or rent it until the time of demolishing. The property owner loses their fixed ownership status and becomes a shareholder within a collective ownership "Mashaa" of the entire area in the Master Plan. They can only sell shares partially or completely. However; this has to be done in less than 12 months. If shareholders did not sell their shares, then they have to select one of the other options within six months period.

The first option is available for them is Registering an apportioned plot; this option requires an agreement between many shareholders to register for an apportioned plot which suits the value of their shares. Once an agreement is reached, an application is made to the local administration unit for approval; upon approval shareholders, then shareholders then share collective ownership of the apportioned plot. The second option is a joint stock company; the shareholders here has to submit an application to the local administration unit for the registering of their joint stock company. The local administration unit is responsible for establishing the company as a joint stock company. The company aim should be of investing these plots commercially as resorts, hotels, malls, or building apartments for sale or lease. The shareholders elect a company board, and then offer the company's capital as cash shares for public subscription. The apportioned plots of the company are registered under the ownership of the company as an entity. Thus, the shareholders are only the part-owner of the joint stock company. If the shareholders cannot sell their shares voluntarily or do not want to register for an apportioned plot or do not choose the option of a joint stock company, the local administration can sell their shares by public auction. Though this law is tried to solve the slums areas problems around the country, it allows the centralization of decisions regarding any process and deducts 20% of the value of people's properties to provide services in return. Moreover, it didn't mention any action regarding the status of agricultural lands inside the selected plots for reconstruction as it didn't refer to the need to return the agricultural areas on which it was built informally before when organizing these areas. On the contrary, it encouraged the transfer of the remaining agricultural lands to investment projects (residential and commercial).

The Marota city project piloted the first use of new decree 66 in 2012, and it has been the blueprint for the new national law introduced in 2018. Decree 66 denied what stated in a previous law enacted in 1975 that any cemented informal unit built on private land has the right to compensation regardless of the ownership. Decree 66 identifies two informal settlement zones in southern Damascus for reconstruction according to the Master plan of Damascus. Marota city takes place in the first zone – called Al Razi which was the informal settlement with 55% of the land being used for informal housing and 45% for agrarian purposes. Decree 66 defined multiple phases of implementation extend over four years until the delivery of alternative housing. Marota City is a warning light about the direction of Syrian reconstruction. It is a reconstruction on land where more than 50,000 people once lived, but where now new laws are being applied that favors profiteering. Skyscrapers for the phantom wealthy in place of houses, shops, and workplaces for war-weary ordinary citizens. It began in 2012 as a new construction project of the government. A city with 215 hectares, was publicized to be part of a more modern aspirational master plan for urban development that looked away from the traditions and patterns of informality.

The area was home to 6733 informal houses and shops built on agricultural lands. Many of whom have lived there for generations, but often without formal documentation. The city master plan provides for many luxurious housing towers in addition to commercial and investment plots, such as hotels, restaurant, cafes and hotel apartments. It is planned as a new city – home for companies, banks, sports facilities, educational institutions, health facilities, gardens, and green spaces. Marota City was planned to be implemented in 4 years (2012-2016). Decree 66 states that property owners become shareholders within collective ownership of the entire area of Al Razi. The construction of Marota City has taken place in phases: 1- a phase about the documentation of ownership. 2- a phase about the validation of homes and issuing of compensatory shares. 3- a phase of implementation and engagement with the private sector.



Figure 22. Marota City's Master Plan.

Source: Marota City

Despite the efforts of the government to find solutions to the problem of the informal areas in Damascus, and reconstruction on the basis of modern and sophisticated, However; the government did not take into account the origin of these lands as agricultural areas that have been settled by the slums throughout the history.

3.7. The Government response to preserve green spaces.

Despite the difficulty of having a careful study of the extent to which the green areas are affected under the current state of the country, Damascus governorate has been striving to limit the impact of urban expansion on green spaces during and after the war. Engineer Ali Sa'adat, a former advisor to the Directorate of Agriculture in Damascus Governorate, says: " Although agricultural areas have increased dramatically over the last decade due to land reform, the areas occupied by buildings, both formal and irregular, have been larger. The cultivated areas in 1995 were about 190,600 hectares, while in 2010 it reached 211,588 hectares, an increase of 20658 hectares, on the whole of the province of Damascus countryside while land occupied by buildings and facilities increased from 72535 hectares in 1995 to 85205 hectares in 2010, an increase of 12670 hectares. It is true that the increases in agricultural land are greater than the size of the land that was consumed by the buildings and facilities, but the last was mostly at the expense of the lands of al-Ghouta. While the land reclamation focused on the mountainous, rugged and desert areas where the constructors and illegal traders are not interested in these areas."

Sa'adat said that it is necessary to take strict procedures to limit the excesses on agricultural land by stopping the urban encroachment and expanding the urban planning in the properties classified according to the land classification schemes issued by the Ministry of Agriculture. Through the amendment of the system of building control in villages, by not expanding horizontally the building on agricultural land and the adoption of vertical expansion in the construction and the establishment of residential communities on the land of state property with the processing of infrastructure to reduce the urban encroachment on agricultural land. Besides, agricultural support should be given for small areas owned by private sectors. With the aim of preserving agricultural land as well as supporting agricultural marketing, and proposing collective irrigation projects a permanent source of water and creating new legislation by the Ministry of Justice to solve the problem of fragmentation and dispersal of agricultural land and the determination of the right to invest agricultural land by one heir and the need to distribute the land income to all heirs according to the applicable legislation, and to find a legal formula for not selling the land in a piecemeal way, but one piece and raise the roof property within the property to more than five acres for one holder, and to find a legal formula for not selling the land in a piecemeal manner, but one piece and raise the roof property within the property to more than five acres for one holder or a group of holders and to not accept the fragmentation of holdings. Moreover, the restoration of the cooperative system applied before 1975 to increase the efficiency of the use of modern agricultural techniques.

However, “a select committee was set up to study all the proposals by the end of the first decade of the second millennium.” Al-Ali (2019). The committee concluded with the establishment of the necessary controls and formulas for building on the agricultural lands. Whereas regard to the approved regulatory schemes for any urban area, when there is objection from a competent public authority to the existence of agricultural land within the organizational chart, the Directorate of Technical Services in the governorate with the administrative authority in coordination with the Directorate of Agriculture have to study the status of these lands and the possibility of removing them from the organization. All of that need to be taking into account the actual and future needs of the gathering of the land required for its urban expansion and to deal with it following the provisions of the Legislative Decree of 1982. As for the projects of the organizational plans and the expansion of the approved schemes, the committee imposed that the administrative body or the organization preparing the draft organizational chart should not enter the fertile, irrigated and wooded agricultural lands within the organizational chart as much as possible and keep them agricultural lands. The committee recommended the resort to the creation of suburbs on non-agricultural land to accommodate the expansion of urban communities located in fertile farming areas and reduce the horizontal spread in these gatherings and apply the investment factor by increasing the number of floors.

In the case of public bodies need for acquisition outside the organizational plans, the committee's conclusion explained that they should move as far as possible from the agricultural land and reclamation projects too. The committee imposed to not to resort to the acquisition of agricultural land, except for the maximum necessities according to technical studies, and in the event of an urgent need for this acquisition, the acquisition of the minimum required area should be considered after obtaining the approval of the Ministry of Agriculture and the General Union of Farmers. The Committee also recommended the prevention of encroachment on agricultural land in Al-Ghouta, Euphrates river bed, Al-Ghab, Al-Ruj, and reclaimed agricultural lands wherever they are.

In addition to all these procedures to reduce the deterioration of green spaces in the capital, Eng. Hiyam Al-Ali (2019) explained that the government has worked on several projects to increase green spaces as parallel solutions such as the Eastern Park project of Damascus (a project of 207,5 hectares). The project will include recreational parks and green ecological reserves that can raise the per capita share of the city's with its western park to 3%. The project considered one of the most important environmental, social, cultural and recreational projects in the city. “The project organized through a competition to increase green spaces before the war, but unfortunately this project is still pending and unaffordable for the government in the current situation.” Al-Ali (2019).

The project, which is being studied in its final stages by the General Company for Studies and suspended by the beginning of the war, is an integrated architectural and urban unit that harmonizes the local and contemporary aspects and linking the green spaces with the service elements while achieving the visitors' need for entertainment in accordance with the highest international standards.



Figure 23. One of the Eastern Park Project Proposals, Damascus
Source: MAG Lab

Al-Ali mentioned that the government also asked Khatib and Alami, the company which was responsible for developing the organizational plan for the city of Damascus before the war, to develop an executive study to increase the green areas to make Damascus as a green city that meets the needs of the citizens through the establishment of industrial and handicraft areas, to encourage the industrial factories in Al-Ghouta to move there, by providing them all the facilities and exemptions needed.

3.8. Conclusion

The problem of informal settlements is still the main planning problem of the country. Despite all the government's procedures and decisions; none of these projects has been achieved especially the projects that have been established to preserve the green spaces in slums areas. The war suspended most of the developmental and greenery projects and considered them as projects with a second priority. Moreover, the urban encroachment continues on agricultural land, putting the major responsibility in the face of the violations of construction on agricultural land on the local administration. Besides, a lot of informal settlement construction is often carried out in the countryside of Damascus without anyone's report. Some irregularities are overlooked, and at other times some of the removals is a sham, as no legal actions have been taken with regard to the agricultural areas that were occupied.

CHAPTER 4

The Risk to Damascus' Green Spaces: National & International Reaction

4.1. Introduction

The essential roles played by green space are the social, financial, cultural and environmental aspect of sustainable advancement. Along these lines, the quality and amount of green space ought to be suitable for the physical size of the city and meet the requirements of society. In general, each inhabitant of the city is allocated a specific area of green areas, where it varies from city to another according to its potential, water sources, and availability of land, while the percentage of green spaces in any city should not be less than 3-4 square meters per person of its urban area. Furthermore, it ought to be developed according to the ecological states of the city and its future advancement pattern. Accordingly, improvement of urban green spaces results in urban ecological growth and causes the advancement of urban life level and sustainable development of urban areas. In Damascus there are 177 open public parks of 138589 square meters, and 772 private parks in the form of buildings' landscape shaped 1048734 square meters of green spaces (Damascus Government, 2012) and in comparison, with similar cities, the per capita share of green spaces in Damascus does not exceed 0.30 in square meter, considering that the population of Damascus is four million. This led to many national and international reactions to preserve what are left of the green spaces in the city.

City	Green areas per capita in square meters
Damascus	0.30
Shanghai	0.77
Taipei	1.29
Tokyo	2.10
Beijing	6.14
Singapore	7.04
New York	19.20
London	22.80
Paris	24.70

Table 1. Green areas per capita in square meters in Damascus in comparisons with similar cities.

Source: Author

Notes: Due to the multiple sources, definitions of green space may vary in different cities. The years of data range from the late 1980s to the early 1990s. (Sources: Beijing / Tianjin / Shanghai / Guangzhou: Comparison of Population Information (Beijing: China Statistical Publishing House, 1992); Martin Perry et al. Singapore, A Developmental City State (Chichester, UK: John Wiley & Sons, 1997).) Roman Cybriwsky, Tokyo, the Shogun=s City at the Twenty-first Century (New York: John Wiley & Sons, 1998); Joochul Kim and Sang-Chuel Choe, Seoul, the Making of a Metropolis (Chichester, UK: John Wiley & Sons, 1997); Victor F.S. Sit, Beijing: The Nature and Planning of a Chinese Capital City (Chichester, UK: John Wiley & Sons, 1995); and Roger Mark Selya, Taipei (Chichester, UK: John Wiley & Sons, 1995).

4.2. National and international NGO's Reaction

Syrian non-governmental organizations have played a significant role in the environmental development of the urban areas in Syria. The Syria Trust for Development, a non-profit organization, headed by First Lady Asmaa al-Assad, despite being a non-governmental organization, has developed several parks in Damascus and organized many events as an initiative to encourage recycling and conservation of the environmental resources of Syrian cities. Also, the organization has also worked to increase green spaces in Damascus by transforming the old fairground in the center of the capital into an interactive 180,000 square meter park to complement the Masar Rose exploration center as a development initiative to promote and increase green spaces.



*Figure 24. Massar Interactive Public parks
Source: Syria Trust for Development*

As a design team leader and architect participated in the development of the project and responsible for drawing up the final master plans for the parks. In one of my meetings with the First Lady in 2015, she noted that "As a developmental organization, our priority and duty now is to deliver electricity and water to the war-affected areas and reconstruct what is destroyed of houses to shelter the displaced people. That's, in my opinion, is better than constructing and implementing projects that cannot affect our basic needs despite its importance to our children and us."

However, the Syria Trust for Development launched many other initiatives to warn the Syrians of the dangers of carbon emissions and their threat to climate change, especially with the high level of air pollution in Damascus during the last decade. One of the initiatives was "Damascus by Bike" a non-profit project, established in 2014 to provide more than 10,000 bicycles in Damascus for public use and encouraging them to reduce

their reliance on private transportation. In any case, and despite their readiness to launch or implement, none of these projects have yet to come to light, because of the financial crises and the blockade that hampered the achievement of all this and froze all these works so far for more than five years.

As for the international reaction, many Arab and international organizations have supported the agricultural sector in Syria to protect the danger of declining agricultural areas in the country; a contribution from the Arab Center (ACSAD) between 2014-2018 in alleviating the crisis experienced by Syria and its repercussions on the rural population, in cooperation with the Syrian Ministry of Agriculture and Spanish organizations. ACSAD carried out 11 development and relief projects in the province of Damascus and other Syrian governorates in Daraa, Hassakeh, Lattakia and Aleppo to contribute to emergency assistance and improve the livelihoods of poor farmers and enhance the food security of the rural population affected by the crisis and who lost their green spaces as a result of the violence of the war through the provision of various inputs of production (seeds, seedlings, pesticides, feed, veterinary tools and agricultural equipment). That was also in response to the prevailing climate changes in the region, which led to the scarcity of water resources in general and as financial support to the local population, especially the most vulnerable rural households, ACSAD has implemented 134 units for rainwater harvesting capacity of 10 to 30 cubic meters per unit. Also, the organization has implemented some 300 training sessions to improve farmers' skills. (ACSAD, 2018)

4.3. The Importance of the City's Green Belt and its Impact on Population-Environment.

Green spaces are the lungs of any city, as well as a source of recreation, a public gathering in a city. The Arab geographer, Al-Muqaddasi (d. 991), mentions al-Ghouta as being one of the six rural territories belonging to the District of Damascus. Historically, the territory developed as a desert garden framed by the Barada stream around the site where Damascus was founded. Since ancient times, channels burrowed by Damascenes provided irrigation of land on either side of the Barada, expanding the size of the Ghouta toward the south and east of the city and isolating the city from the dry fields circumscribing the Syrian Desert. The Eastern and Western Al-Ghouta are not only forming the green belt of the greater Damascus but also supply the important needs for the city in the form of oxygen and agriculture produce by providing Damascus's inhabitants with a variety of cereals, vegetables, and fruits. The benefits of green areas should be provided where the demand exists, particularly since the impacts of green spaces are spatially confined.

4.4. Cultural response.

Since their first day on this land, the early inhabitants of what is known as Syria now are known for their agricultural work and was the first to discover the first plow in history. Throughout history and since the first urban formation of the city of Damascus, the Damascusites embraced nature even in their houses. The so-called "Ard Diyar" an inner courtyard, was one of the foundations of the architectural design of any Damascene house. It includes a group of plants of trees and flowers to bring the ecological character to the house. They were proud of the types of trees they cultivated in terms of shape, size, color, and often even smell.



Figure 25. Kasar Al Azem Courtyard
Source: Author, 2019



Figure 26. Damascene Houses Inner Courtyards
Source: Al Baroudi, 1978

The open courtyard “Ard Diyar” was of great importance in providing the environmental moisturizing of the house through the shade of the inner trees and the water fountain in the center.

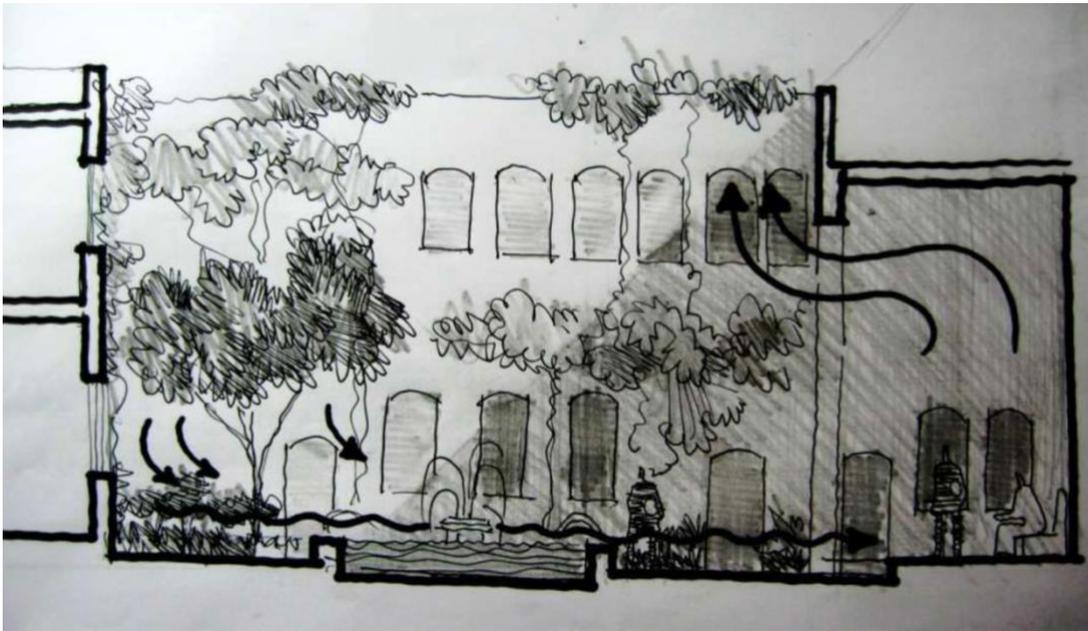


Figure 27. Section Showing the Role of Trees in the Moisturizing the Inner Environment and The Movement of Air currents in the Inner Courtyards.

Source: Author

However, with the significant population growth in recent decades and the development of architectural methods, the building style, which was known by the Damascene, differed. The high buildings invaded the new neighborhoods of the city. However, they still influenced by the Damascene architecture of an environmental nature, so they used the French-Swiss architect Le Corbusier's style in their construction by lifting the building block from the ground with columns to exploit the land of the building with green spaces and to preserve it.

This did not last long. In recent decades, most Syrians have moved to close these spaces and turn them into entertainment halls for construction and shopping centers. Not to mention today their exploitation of agricultural land and converted into residential and commercial lands too, that's because of the need for housing with the absence of government control due to political and living conditions during the war. Despite all this, the Syrian interest in the green and agricultural areas is still one of their priorities. Today, it's barely to visit a house in Damascus without a green element inside or on the balconies. Besides, many popular and student protests were pre-war and still to this day organized by schools and universities to demand the preservation of the remaining green areas in the capital Damascus.

Conclusion

The importance of urban green spaces has been known for decades; however, the relationship between urban livability and green spaces has become the focus of international studies, especially over the past ten to fifteen years (Caspersen, 2006).

The danger of urbanisation that threatens Damascus's green spaces today is not new. Since the first stone was erected in 5000 BC, it was at the expense of its green spaces and fertile soil. Despite the observance of some civilizations and respect for the sanctity of these areas, Damascus has been draining its green and agricultural land for its unplanned urban expansion on the one hand and the greed of investors to achieve a profitable return later on the other. Today, Damascus suffers not only from the decline of its green areas, but from the contamination of the remnants of war as a result of the use of heavy weapons which hit the rest of the city's agricultural lands during the war, as well as the suffering of farmers in securing fertilizer and agricultural supplements as a result of the embargo imposed on the country for more than 9 years during the war. Damascus, which gave the world the first plow, and the first grain of wheat in history, is importing wheat from neighboring countries today, while informal settlements are destroying the lands of the rest of its production of agricultural crops, which were famous for it through its history.

The problem cannot be confined to a single historical period. Every era had its advantages and disadvantages that analyzed in this report, and what the city is facing today, is the results of lack of planning to accommodate the population growth and dereliction of laws during all its history. This paper showed that the value of green spaces should be first in terms of direct and indirect importance. and secondly measured and quantified in order to be prioritized to conform with urban development strategies and plans and other development such as housing provision, commercial developments. Since there is no one blue-print for delivering sustainable development by preserving the green spaces in the cities and protect them, as it requires different strategies in different societies. These classified green space values should be linked in monetary terms to compete with development pressures (Stevens, 1988). If the value of green spaces could be stated in monetary terms, it would consequently have more weight in the development decision-making process (Luttik, 2000). As development decisions are often based on comparisons of monetary values, such as cost-benefit analysis. This furthermore stresses the importance to supply public decision-makers (local authorities) with reliable, comparable valuations methods (Deftancesco, 2006).

Moreover, the developments of urban green spaces need to consider interdisciplinary and integrative approaches such as economic, social, cultural, management and planning aspects to improve existing urban spaces' facilities and services and to optimize urban green space policies, that's due to its multitude of benefits to human urban populations, its role in improving physical fitness and reducing depression, and enhance the health and wellbeing of people living and working in cities. It is imperative for urban planners when planning any particular city or community to consider the presence of green areas and organize it to fit the new city or region plan and its area, considering the existing vegetation. As for the newly organized areas, trees supposed to be planted since the beginning of the implementation because it takes a period to reach the form and beauty to meet the requirements of the population at the level of the residential group or the city or even at the level of the region. The city planners have to cooperate with agricultural engineers specialized in street gardens because It is necessary to choose the species that can be pruned and do not cause harmful effects in the paving of streets or sidewalks and prefer to cultivate species with good smells and avoid species with fallen leaves.

In Conclusion, this study validates the role of the planner as a mediator for a green city and the importance of involving green spaces as a key to ensure space sustainability. This paper investigated the dangers and challenges that faced Damascus' urban expansions during its history and the potential proposals of its urban planning development in shaping and acquiring green areas and regions. Whatever the history or the disaster the city or the country is faced, the solution needs to look at the role of planning in the face of the challenges of growth and urban expansion (formal and informal) of any city and questions its ability to turn these challenges into opportunities for current and future generations.

Interviews

Asmaa Al Assad:

The First Lady and Secretary General of Syria Trust for Development (NGO), Damascus. Interview 12th June, 2015.

Hiyam Al-Ali:

Advisor to the Governor in the field of urban and regional planning, Damascus. Interview 2nd June, 2019.

Hassan Al-Haj:

Assistant to the Minister of Public Works and Housing in Urban Planning and Organization, Damascus. Interview 30th May, 2019.

Ali Sa'adat:

Former advisor to the Directorate of Agriculture in Damascus Governorate, Damascus. Interview 26th May, 2019.

Bibliography

1. ACSAD 2018, Agricultural and Water Report in the Arab World 2018.
2. Acun, F. (2002) A Portrait of the Ottoman Cities, The Muslim World Vol 92, No 3, pages: 255-285.
3. Ades, A. Glaeser, E.L. (1995). Trade and circuses: Explaining urban giants. Quarterly Journal of Economics Vol 110 No 1, pages: 195-227.
4. Arnaud, J.L. (2006) Damas: Urbanisme et Architecture, 1860-1925 Paris: Sinbad-Actes Sud.
5. Atash, F. The Deterioration of urban environments in developing countries: Mitigating the air pollution crisis in Tehran, Iran. Cities Vol 24 No 6, pages: 399-409
6. Barakat, H. (1993) The Arab World: Society, Culture and State Berkeley: University of California Press.
7. Burns, R. (2005) Damascus: A History London: Routledge, page.36.
8. CLERC V. and HURAUULT H. (2010). « Property Investments and Prestige Projects in Damascus: Urban and Town Planning Metamorphosis,» Built Environment, Vol.36, No2, « Arab Mega Projects,» pages: 162-175.
9. D. Ruggles, F., Garden, landscape, and vision in the palaces of Islamic Spain, The Pennsylvania state university press, U.S, A, 2000.
10. Damascus Government (2012). Urban and Environmental Report of Greater Damascus 2012.
11. Delf R. (2015). The Value of Landscaping, Virginia Cooperative Extension, Publication 426-721.

12. E. Deftancesco, P. Rpsato and L. Rossetto (2006) On the Appraisal Approach to Valuing Environmental Resources, Valuing complex natural resources systems: The Case of the Lagoon of Venice, Cheltenham, UK: Edward Elgar Publishing, Pages: 40-57.
13. El-Laithy, H., Abu-Ismaïl, K. (2005) Poverty In Syria 1996-2004: Diagnosis and Pro-Poor Policy Considerations Damascus: United Nations Development Program.
14. El-Laithy, H., Abu-Ismaïl, K. (2005) Poverty In Syria 1996-2004: Diagnosis and Pro-Poor Policy Considerations Damascus: United Nations Development Program.
15. Fries, F. (2000) Damas (1860-1946) La mise en place de la ville moderne. Ph.D. thesis University of Paris 8.
16. Government of Syria, 2010, The Informal Settlements Upgrading Rehabilitation National Programme (ISURNP), Ministry of Local Administration.
17. Harvey, D. (1973). Social Justice and the City. Oxford: Blackwell. Page 289.
18. J. Luttik, the value of trees (2000) Water and Open Spaces as Reflected by House Prices in the Netherlands, Landscape and Urban Planning, Vol. 48, Pages. 161-167.
19. Kennedy, H. (1985) From Polis to Madina: Urban Change in Late Antiquity and Early Islamic Syria Past and Present No 105 pages: 3-27.
20. Khoury, P.S. (1984) Syrian Urban Politics in Transition: The Quarters of Damascus during the French Mandate International Journal of Middle East Studies Vol 16 No 4 p 507-540
21. Lapidus, I.M. (1973) The Evolution of Muslim Urban Society, Comparative Studies in Society and History Vol 15 No 1 pages: 21-50.

22. Lu, D., & Weng, Q. (2004). Spectral mixture analysis of the urban landscape in Indianapolis with Landsat ETM+ imagery. *Photogrammetric Engineering & Remote Sensing*, 70(9), pages: 1053–1062.
23. Mehdi R., Johari M. and Asfhin S. (2017) Terminology of Urban Open and Green Spaces. Research Gate. Conference Paper on 11th ASEAN Postgraduate Seminar, APGS 2017, At Faculty of Built Environment, University of Malaya, Malaysia.
24. Njoh, J. (2016) *French Urbanism in Foreign Lands*, Springer, Pages: 125-128.
25. O.H. Caspersen, C.C. Konijnendijk and A.S. Olafsson (2006) *Green Spaces Planning and Land Use: An Assessment of Urban Regional and Green Structure Planning in Greater Copenhagen*, *Geografisk Tidsskrift, Danish Journal of Geography*, Vol. 106(2). Pages 7-20
26. Olsson, H. (2012). *Integrated Green Spaces in Urban Areas*.
27. Regional Planning Commission (2013) الخارطة الوطنية للسكن العشوائي، التصنيف الشامل للمناطق السكن العشوائي في ريف دمشق.
28. SAKKAL, S. (1998) L'urbanisation non réglementaire à Alep, in *Aménagement urbain dans le monde arabe*, Cahiers d'Urbana, n°14, pages : 47-57.
29. Smiatek, G., et al. (2013). Hydrological Climate Change Impact Analysis for the Fiegh Spring near Damascus, Syria. *Journal Of Hydrometeorology*, No: 14, Pages:577-593.
30. Sukkar, N. (2006) *Pitfalls Along Reform Road in Emerging Syria* Oxford: Oxford Business Group available from: www.scbdi.com/uploads/File/Emerging_Syria_2006.pdf
31. Syrian Center for Policy Research (SCPR) (2015). *Syria Confronting Fragmentation! Impact of the Syrian Crisis Report*.

32. Syrian Center for Statistic and Research, Statistical Yearbook 2001-2010.
33. T. Stevens, A.T. More and P.G Allen (1988) Valuation of Urban Parks, Landscape and Urban Planning, Vol. 15, Pages. 139-152.
34. Tahir, O. M., & Roe, M. H. (2012). Sustainable Urban Landscape: Making the case for the Development of an Improved Management System. ALAM CIPTA, International Journal of Sustainable Tropical Design Research and Practice, 1.
35. UN-HABITAT (2001) Syria: Statistical Overview available from <http://www.unhabitat.org/categories.asp?catid=169> Accessed May 28th, 2008.
36. United Nations. (2018) World's Cities in 2018, Department of Economic and Social Affairs, Population Division (2018).
37. Walker, R. and Craighead, L. (1997) Analyzing wildlife movement corridors in Montana using GIS. Proceedings of the Environmental Systems Research Institute User's Conference, July 8-11, 1997.
38. Wang, P., & Gao, J. (2012). Research on the Open Space in Urban Areas of Taiyuan. Proceedings of the 2nd International Conference on Electronic and Mechanical Engineering and Information Technology (2012), 487–490. doi:10.2991/emeit.2012.99
39. Wolf, K. L. (2004). Trees, Parking and Green Law: Strategies for Sustainability. Stone Mountain, GA: Georgia Forestry Commission, Urban and Community Forestry, pages: 12-13.

Green Spaces Under Threat: The Case of Damascus

Abstract:

The research study aims to shed the light on practices and policies threatening the Green Spaces in the city of Damascus. Urban green spaces are one of the most significant elements of any urban ecosystem, both due to its ecosystem dynamics and its essential contribution in well-being of human race. However, it is ironic that despite of its immense significance, vegetation is undergoing destruction and degradation in the modern times due to rapid and haphazard urbanization not only in Damascus but also in many big cities around the world, making urban settlements major source of GHG emissions and at the same time making them more vulnerable to global environmental change impacts. The research study shows the disappearing of green spaces in greater Damascus through its history, and how they were formally and popularly confronted on various political, planning and cultural aspects.

Keywords:

Damascus, Green Spaces, Unplanned Urban Sprawl, Urban Transformation.

Student: Alaa HASANEN

Email: ah@alaahasanen.com

Supervisor: Prof. Laura VERDELLI

Date of Submission: 16th June, 2019



35 Allée Ferdinand de Lesseps
37200 Tours, France
Tél. +33 (0)247 361 452

Website : <https://polytech.univ-tours.fr/formations/international-research-master/research-master-planning-and-sustainability/>