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URBAN AGRICULTURE AS A DESIGN STRATEGY TO IMPROVE LIVELIHOODS IN DISADVANTAGED NEIGHBORHOODS: THE CASE OF NABAA (BOURJ HAMMOUD, BEIRUT)

By
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A thesis
submitted in partial fulfillment of the requirements
for the degree of Master of Urban Design
to the Department of Architecture and Urban Design
of the Faculty of Engineering and Architecture
at the American University of Beirut

Beirut, Lebanon
April 2015

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ACKNOWLEDGMENTS

I would like to express a deep sense of gratitude to my family, professors and friends for their inspiring guidance, and valuable support.

To my exceptional advisor Dr. Yaser Abunnasr, I thank you for mentoring my research since my undergraduate years at AUB and following up with me until my graduate studies. I can never thank you enough for supervising this thesis, for the time spent in meticulously reviewing and advising the research methodology and process.

To my reader Dr. Mona Fawaz, I thank you for your constructive feedback as well as for introducing me to the Nabaa neighborhood, for giving me the great opportunity to choose it as a case study for my thesis, introducing me to key informants in the neighborhood and supplying me with basic documents and maps that were at the core of the thesis analysis.

To my reader Dr. Shadi Hamadeh, thank you for your valuable sources, insights, and expertise regarding urban agriculture.

To Dr. Mona Harb, thank you for your constant support and encouragements to finish this thesis on time.

I also express my gratitude to Nabaa's dwellers and residents, who engaged me in the life of the neighborhood and guided me through its streets. I would like to mention in specific the contribution of Hayat Fakhreddine, and the municipality of Bourj Hammoud who provided me with information about the neighborhood.

To my colleague and friend Petra Samaha, thank you for making the thesis and field work in Nabaa much more enjoyable. I have learned so much from you during the graduate years and your presence and support was a true blessing. My appreciation goes also to my friend Massa Ammouri for her great support.

I would like to thank my family, my mom, dad and brother. To my mother, for making me the person I have become today; to my father, for always pushing me to achieve more; to my brother, for his continuous support and to Bechara Maalouf for his positive energy, encouragements and help.

This thesis was supported by a grant from AUB - Issam Fares Institute for Public Policy and International Affairs Social - Justice and Development Policy Program. I would like to thank Mr.Rami Khouri and Leila Kabalan for the support.

AN ABSTRACT OF THE THESIS OF

Rouba Bassam Dagher for Master of Urban Design
Major: Urban Design

Title: Urban Agriculture as a Design Strategy to Improve Livelihoods in Disadvantaged Neighborhoods: The Case of Nabaa (Bourj Hammoud, Beirut)

Securing food and open spaces contributes to sustainable solutions by improving livelihoods in dense and low income neighborhoods. This thesis investigates the potential contribution of agriculture as an urban strategy to improve residents' quality of life in Nabaa neighborhood in Bourj Hammoud. Building on recent literature of urban agriculture forms, tools and case studies, the thesis employs research tools from urban and landscape design that includes a field survey, questionnaires and suitability analysis to identify a strategy that incorporates potential land assists and neighborhood practices.

The thesis proposes design principles that support agriculture as a multifunctional space and offers a set of design strategies that aim to integrate diversity of local interests and uses into the designated spaces for urban agriculture. Such strategies aim to develop a food production network that supports daily living of the residents. It also provides a larger spectrum of opportunities for public use thus enhancing the built environment and improving people's quality of life through contributing to connectivity, food security and a healthy recreational environment, among supporting other community needs.

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ABBREVIATIONS

AUB	American University of Beirut
UNHCR	United Nations High Commissioner for Refugees
FAO	Food and Agriculture Organization of the United Nations
UNDP	United Nations Development Programme
UN Habitat	United Nations Human Settlements Programme
RUAF	Resource Centers on Urban Agriculture and Food Security
IFAD	International Fund for Agricultural Development
IDS	Institute of Development Studies
SL	Sustainable Livelihoods
CPUL	Continuous Productive Urban Landscapes
MENA	Middle East and North Africa
CDR	Center for Development and Reconstruction
GIS	Geographic Information Systems

PREFACE

My interest in contributing to disadvantaged communities started with my landscape design formation in AUB when I worked on designing green open spaces. Those spaces were designed to be used by refugees and disadvantaged communities in Debbiyeh and the informal settlement of Hay el Selloum along the Ghadir River. This interest grew in my graduate years when I was introduced to Nabaa neighborhood through Dr. Fawaz and to urban agriculture through Dr. Abunnasr.

When I visited Nabaa neighborhood for the first time, I got interested in its distinctive diverse character as well as in the residents' green practices. For this thesis work, I employed tools from both fields of urban and landscape design to service the neighborhood of Nabaa by proposing creative productive open spaces that hope to serve the community. I believe that in disadvantaged urban developments, design and planning can truly make a difference. Simple and small design interventions can have a great influence and contribute positively to communities in need, so "that they may have life and have it more abundantly".

To my family, my ultimate source of motivation.

CHAPTER I

INTRODUCTION

A. Introduction

Beirut is facing many problems: rapid urbanization, increasing population growth, rising poverty levels as well as a drastic lack of green spaces. The number of impoverished communities in Beirut's expanding peripheries is growing as it absorbs migrants and refugees sharing scarce resources and limited space with Lebanese living below the poverty line. One of the current and pressing challenges is to formulate sustainable solutions for expanding cities and to improve the quality of their livelihoods. Securing food and livable open spaces are among the challenges faced that can be addressed through urban agriculture, a multidisciplinary field based on growing food, plants and livestock. Each urban agriculture project arises in response to the particular needs and opportunities of a given community. This thesis contributes to solving this problem by proposing productive shared spaces in the disadvantaged neighborhood of Nabaa in Bourj Hammoud located along the Beirut River on the city's periphery. Nabaa, once part of major agricultural lands that were important food support to the city, have been transformed into a misery belt: a dense and poor neighborhood housing a diverse community lacking open spaces and growing to the detriment of remaining agricultural land. How to reintegrate agriculture in this peripheral neighborhood and at the same time support the lives of its low income communities?

B. Research question, hypothesis and significance

The objective of this thesis is to use the multifunctional dimension of urban agriculture as a design strategy in the disadvantaged neighborhood of Nabaa. To address this objective, I propose the following research question: How can urban agriculture strategies be developed on different types of built and unbuilt surfaces to improve livelihoods of communities through food production and recreation in disadvantaged contexts? By analyzing the different urban agriculture strategies that can be applied in the neighborhood, I hope to contribute to improving the dwellers wellbeing. The aim is to address issues of Nabaa through the sustainable livelihood framework aimed at introducing opportunities for public use, enhancing people's quality of life and the built environment, by providing multifunctional and productive shared open spaces.

The thesis is organized as follows:

Chapter II focuses on the literature on sustainable livelihoods, and how urban agriculture, through its potentials and tools of intervention, can contribute in improving livelihoods. The chapter also presents case studies of urban agriculture both in theory and in practice in different contexts.

Chapter III explains the methods used in this thesis work.

Chapter IV introduces the case study area of Nabaa neighborhood in Bourj Hammoud.

Chapter V analyzes the case study.

Chapter VI proposes an urban agriculture strategy for the case study.

Chapter VII concludes with the research findings, outcomes and limitations.

CHAPTER II

LITTERATURE REVIEW & CASE STUDIES

A. Sustainable livelihoods (SL) framework

1. Definition: What are sustainable livelihoods?

There are many definitions for Sustainable Livelihoods. A conventional definition of a person's livelihood refers to their means of meeting basic life needs such as water, food, shelter and clothing. The concept of Sustainable Livelihood (SL) offers an integrated approach to poverty that goes beyond that conventional definition by considering other vital aspects of poverty that were not included such as vulnerability and social exclusion. It recognizes the various factors and processes which either constrain or enhance poor people's ability to make a living in an economically, ecologically, and socially sustainable manner (Krantz, 2001). It also adopts a distinctive perspective on how to intervene to improve the conditions of the poor. The framework is often used in planning new development activities and in assessing the contribution that existing activities have made to sustaining livelihoods.The sustainable livelihoods idea was first introduced by the Brundtland Commission on Environment and Development, and the 1992 United Nations Conference on Environment and Development expanded the concept, advocating for the achievement of sustainable livelihoods as a broad goal for poverty eradication (Krantz, 2001).

I will adopt the definition by the Institute of Development Studies (IDS): *"A livelihood comprises the capabilities, assets (including both material and social*

resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base." The application of the sustainable framework is tailored to accommodate the different contexts (Farrington 2002).

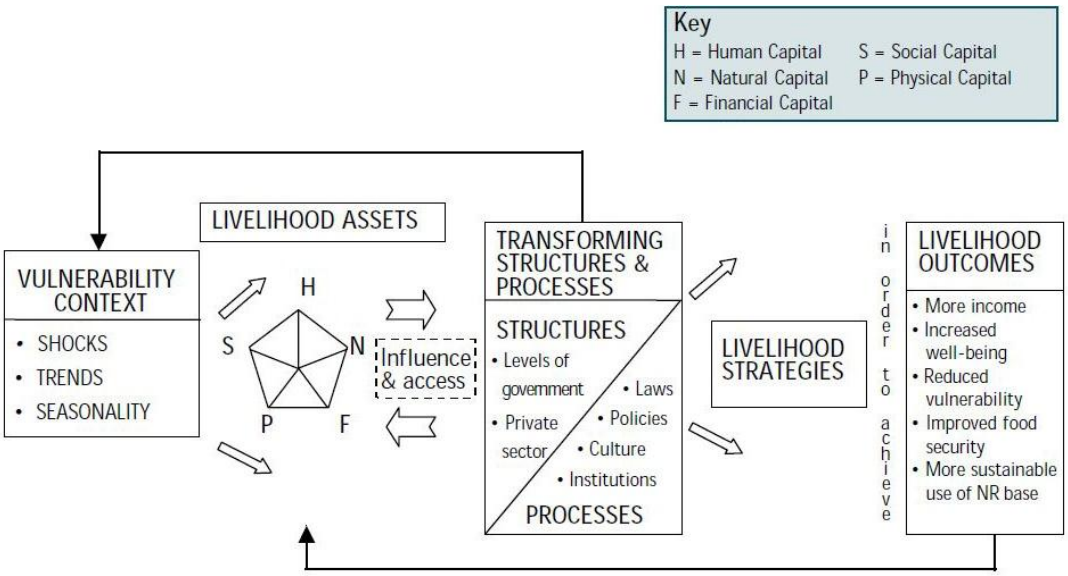


Figure 1: Sustainable Livelihoods Framework *(Source: DFID, 2001)*

2. Sustainable Livelihoods (SL) indicators

The sustainable livelihood approach has seven guiding principles or indicators that do not prescribe solutions or dictate methods; rather they are flexible and adaptable to diverse local conditions. The guiding principles are:

1) ***People-centered.*** SL begins by analyzing people's livelihoods and how they change over time. The people themselves actively participate throughout the project cycle.
2) ***Holistic.*** SL acknowledges that people adopt many strategies to secure their livelihoods, and that many actors are involved; for example the private

sector, ministries, community-based organizations and international organizations.

3) ***Dynamic.*** SL seeks to understand the dynamic nature of livelihoods and what influences them.
4) ***Build on strengths.*** SL builds on people's perceived strengths and opportunities rather than focusing on their problems and needs. It supports existing livelihood strategies.
5) ***Promote micro-macro links.*** SL examines the influence of policies and institutions on livelihood options and highlights the need for policies to be informed by insights from the local level and by the priorities of the poor.
6) ***Encourage broad partnerships.*** SL counts on broad partnerships drawing on both the public and private sectors.
7) ***Aim for sustainability.*** Sustainability is important if poverty reduction is to be lasting.

This thesis will focus on how urban agriculture can act as an integrating tool for creating an urban environment supporting livelihoods in low income neighborhoods, by building on the following selected principles of sustainable livelihoods framework: the community strengths, aiming for sustainability and promoting micro-macro relationships between the neighborhood and its surrounding.

B. Urban agriculture sustaining livelihoods

1. Urban agriculture definition

The term 'urban agriculture' is associated with different definitions in the literature. The American Planning Association include in its definition of urban agriculture both inner city and peri-urban agricultural activities, with a purpose "beyond that which is strictly for home consumption or educational purposes, production, distribution and marketing of food and other products within the cores of metropolitan areas and at their edges"[1]. These are not necessary requirements, but are important factors undermining urban agriculture. Urban agriculture has experienced a renaissance in recent years. It is recently a growing multidisciplinary field of research that is fueled by rising public interest in food and its production and distribution in a globalized world, requiring input, coordination and overlay across multiple disciplines from agriculture to urban design and planning, landscape architecture, architecture, economics, engineering and art. It is a fertile area for research that is challenging and multidimensional and likely to have greater impact on communities within cities.

2. Urban agriculture in two different contexts

Practiced today in both developed and developing countries, urban agriculture often serves different purposes (Lteif, 2010).

a. Urban agriculture in developed countries

In developed countries, urban agriculture is shifting towards a "multi-functional landscape" catering for needs and functions beyond the economic, such as

[1] https://www.planning.org/

social or recreational (Viljoen, 2005). Other areas of academic research are assessing the impact of green and/or productive space in the urban environment with respect to human well-being". These works analyze and recognize the environmental (Thiebaut, 1996) and leisure (Le Caro, 2002) functions of urban agriculture as well as its contribution to food production. Recent literature in developed countries is focusing today on how urban food production spaces can be converted to new forms both in the public and private domain. Some developed countries are currently introducing urban agriculture as a greening strategy in their urban planning and design strategies. Research initiatives, such as the Carrot City or CPUL (Continuous Productive Urban Landscapes) have aimed at exploring the relationships between design and multifunctional urban food systems as well as the impact that agricultural issues have on the design of urban spaces and buildings (Nasr, 2011). The next two sections briefly describe these two initiatives.

i. Carrot City:

Carrot City is a global network of food production demonstrating the different forms and functions urban agriculture can have, from green roofs to green walls and productive land (Figure 2). It demonstrates that design can both, enable food production in cities and disseminate ideas and knowledge about its practices. Carrot city looks at urban agriculture across five distinct scales: city, community and knowledge, housing and the components for growing by constructing a grid of strategies providing different options for urban agriculture.

Figure 2: Carrot city *(Source: http://www.ryerson.ca/carrotcity/)*

ii. CPUL (Continuous Productive Urban Landscape):

Continuous Productive Urban Landscape (CPUL) is an urban design concept that was first articulated and designed in 1998 advocating the introduction of interconnected productive landscapes into cities as an essential element of sustainable urban infrastructure (Bohn & Viljoen Architects). The concept has received international attention and entered into the contemporary design discourse. Central to the CPUL concept is the creation of multi-functional productive open space networks in urban contexts that complement and support the built environment. It also argues that Productive Urban Landscapes containing urban agriculture and supplying local outlets with the produce are environmental solutions that can contribute to the food requirements of a certain city. They have demonstrated that "a city like London could produce about 30% of all fruit and vegetable requirements of its population from within the city boundary."

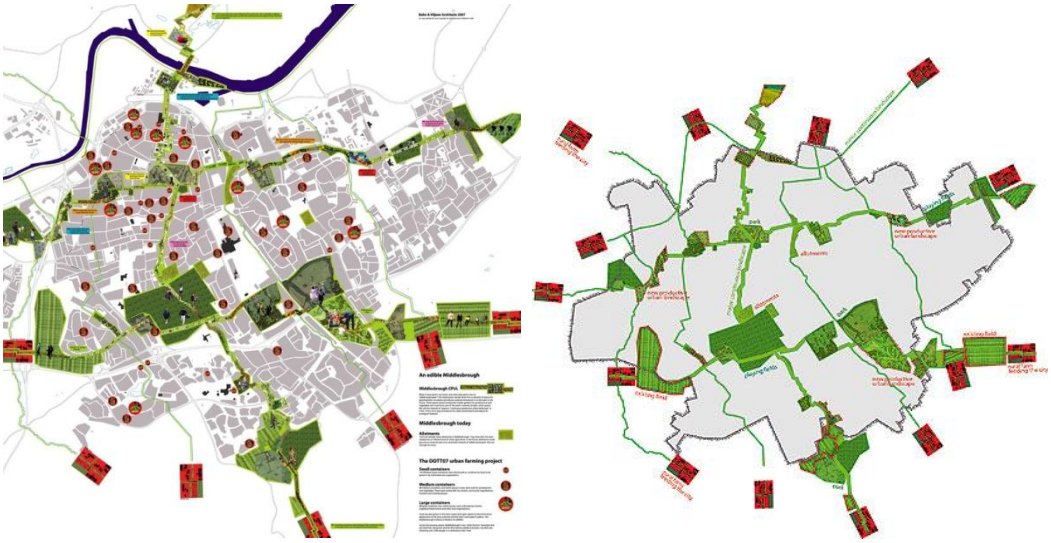


Figure 3: Middlesbrough CPUL. (Source: Carrot city)

iii. Prinzessinnengarten (Berlin):

Prinzessinnengärten (Princess Gardens) is another example of a small scale "self organized urban agriculture project run as a social business". It is a pilot project launched by the "Nomadic Green" NGO in Berlin in 2009 on a site which had been a wasteland for over half a century. After cleaning the site from rubbish, a group of activists and neighbors built a mobile urban farm with transportable organic vegetable plots. Local residents customized their own edible open spaces, providing local organic food for neighbors and the garden's restaurant. The project focuses on the social potential of urban agriculture more than the production of fruits and vegetables; food becomes the common language bridging the gap between different generations, as well as economic, social and cultural backgrounds in a neighborhood that is one of "the most densely developed and socially most vulnerable" (Clausen, 2013). It also highlights its place making component.

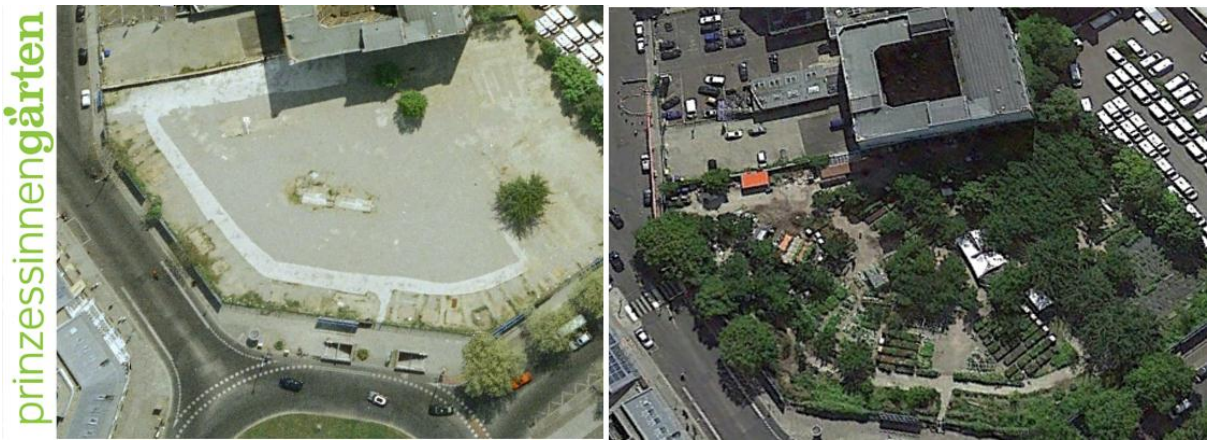


Figure 4: Prinzessinnengarten project before and after.
(Source: http://prinzessinnengarten.net/)

These case studies reveal the multifunctional aspect of urban agriculture and its potential to provide spaces for recreation and social interaction, an aspect that are often non present in agricultural spaces in disadvantaged communities.

b. Urban agriculture and disadvantaged communities

Food security for disadvantaged communities is a main challenge. The World Food Summit of 1996 defines food security as follows: "Food security means that food is available at all times; that all persons have means of access to it; that it is nutritionally adequate in terms of quantity, quality and variety; and that it is acceptable within the given culture. Only when all these condition are in place can a population be considered food secure" (United Nations' Food and Agriculture Organization). Food security is a human right bearing complex social, economic and political dimensions that cannot be addressed separately. Many studies focus on the contribution of urban agriculture to poverty reduction and food security in developing countries and poor areas. Most cities in such contexts practice agriculture as a single purpose activity for the sole purpose of food production. Small scale production is used mostly for self consumption with surpluses being traded, providing food and supporting livelihood for

many citizens (Lteif, 2010). Other studies focus on the positive social impact of urban agriculture in places with high indices of social deprivation.

i. Urban agriculture in 21st century Lebanon

Agriculture in Lebanon is an important sector contributing to about 12% of the GDP and employing 9% of the workforce. In the Lebanese urban context, agriculture occurs mainly on the coast and for the exclusive goal of food production. Many local projects and initiatives are aiming to reintroduce agriculture in different contexts in the city.

Theoretical projects:

Most of the conceptual proposals such as the 'Beirut Wonder Forest' project proposed greening strategies for Beirut at a city scale such a planting on building rooftops (Figure 5), however they do not address the potential of including productive landscapes such as fruit trees for example in their proposal. Furthermore, most of these utopian projects tackle the city without looking at the applicability of the approach on the city's peripheries hosting poor environments and communities.

Figure 5: Beirut Wonder Forest project (Source: StudioInvisible)

From theory to practice-Successful models:

One of the small scale executed projects that aimed at introducing agriculture in disadvantaged environments was in the Ein El Helweh Palestinian refugee camp. The

project was a collaboration between the American Near East Refugee Aid organization (ANERA) and AUB. It aimed at ameliorating living conditions of the camp's residents through a capacity building program on urban agriculture that includes rooftop rain-water collection systems and vertical plantings. The intervention is intended to improve air quality as well as offer a visual break from the oppressive grayness of crowded camp living. Other projects done by the Center for Civic Engagement & Community Service (CCECS) in AUB work with refugees but very few include the food production aspect in their interventions.

Other projects targeting rural agriculture have taken place. The "Healthy Basket" (HB) started in 2001 as an initiative by the American University of Beirut to support and improve Lebanese farmers' livelihood in rural areas. by adopting organic agriculture as a key strategy, the project aims at preserving the environment and protecting human health[2]. Fresh products sold by HB are grown by small farmers throughout Lebanon.

Looking at the different case studies from different contexts, it is important to look at how and where urban agriculture can be applied in congested low income environments where space is scarce.

[2] www.healthybasket.org

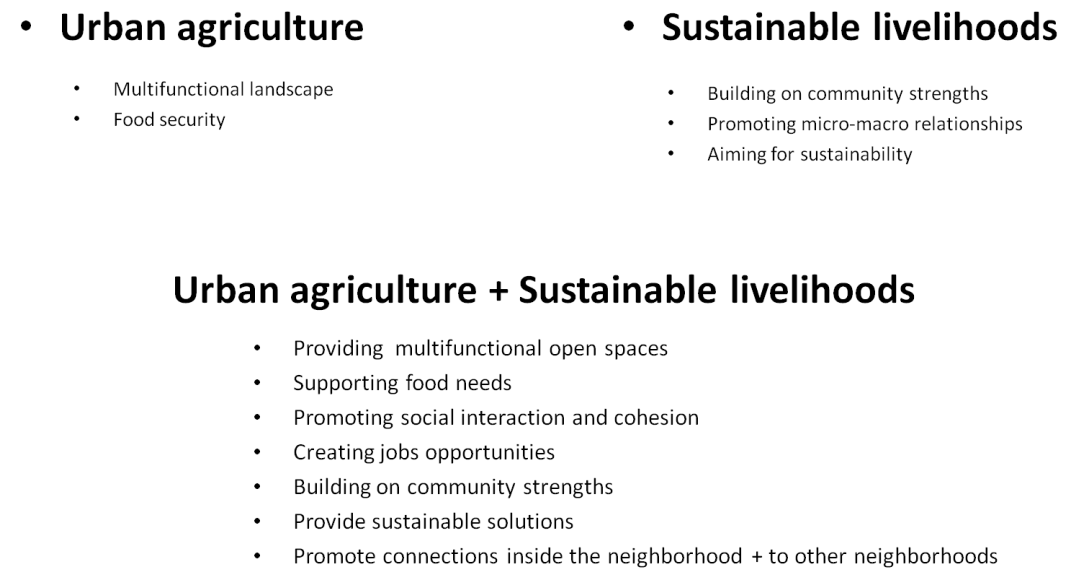


Figure 6: Framework

C. Surfaces and forms for urban agriculture

The recent renewed interest in urban and suburban agriculture comes in different forms or strategies of intervention: backyard and balcony gardening, rooftop gardening, community gardens, city farms, and vertical farms (Gerster-Bentaya, 2013, p. 723). The available literature covers a plethora of applications; however I will look closely at three potential surface areas relevant to dense disadvantaged urban neighborhoods where agriculture can be used: the land, the building and the street.

1. Urban agriculture on land

Land has always been the conventional location of growing food. Urban agriculture has become an attractive land use because of its potential to addresses multiple needs. If available, vacant land located in deteriorated neighborhoods often become gathering places for garbage instead of people, 'collecting physical detritus and often causing social malaise' (Langegger, 2013, p.184). However, these vacant lands have the potential to be used as public spaces. Very often, the community informally

appropriates develops and continuously manages such spaces. Many communities rely today on urban agriculture as a mode to achieve not only food security and sustainability, but also community resilience, vacant land remediation and neighborhood development (Meenar, 2012). Often urban agriculture initiatives take root on vacant parcels, ranging in scale and scope from small community gardens to large urban farms run and supported by commercial market gardeners, community members, activists, non-profit organizations, and local governments. Other types include integrating agricultural practices within existing institutions such as city parks, schools and universities. For example, universities and schools often have open spaces that have the opportunity for involving the students in producing productive spaces. A showcase is the Rice Campus of Shengyang Jianzhu University in China (Figure 7). Rice and other native crops are grown on campus uses in order to keep the land productive as well as to fulfill new functions for learning, recreation and open space. It demonstrates how a productive agricultural landscape integrated a design responding to two of the biggest current issues that China' is facing as it moves towards modernization: food production and sustainable land use.

Figure 7: Rice Campus of Shengyang Jianzhu University in China by Kongjian Yu, Landscape architect. (Source: http://www.asla.org/)

a. Community gardens:

The involvement of urban poor in food production can develop their resilience to social and environmental threats and are a great tool for empowering communities. Community-oriented, productive landscapes have the capacity of both educating about food as well as enhancing community engagement and inclusiveness in urban neighborhoods by offering to people the opportunity to come together to create productive urban green spaces. Community gardens make it possible for people with different backgrounds and ethnicities to meet and socialize. They catalyze positive change and act as springboards to social and economic activities, especially in low income neighborhoods (Kearney, 2009). I will briefly introduce two community gardens models: the collective community garden and the allotment community garden.

Collective community gardens follow the principle of "all for one harvest, one harvest for all," (Food Security Network of Newfoundland and Labrador, 2001, p.6) where the efforts of a group are combined to cultivate often one large land from which everyone shares the harvest. Growing communally requires a certain amount of cooperation and works best with a small number of participants (ibid). This style is well suited for groups that already have a strong membership that meet regularly and may be able to garden at the same place where they currently gather, such as schools and religious organizations (ibid).

Allotment community gardens subdivide the land into parcels that are each independently maintained by assigned individuals, community organizations or families. This model is often used to provide space for people who may not have access to it at home, or at their facilities.

The community garden is the precursor of Victory gardens also known as war gardens. These were vegetable, fruit, and herb gardens planted in private residences and public parks in the United States, United Kingdom, Canada, Australia and Germany during World War I and World War II. They were often sponsored by the government and their aim was to reduce pressure on the public food supply. They were also considered as a tool of community empowerment where residents would feel happy about their contribution of labor and rewarded by the produce grown. By growing fruits and vegetable close to home, the gardeners were also eliminating the fuel consumption and air pollution associated with transporting food from distant production sites.

Again, during the financial crisis of the 1970s, large sections of New York City were abandoned by landlords and city officials. Local residents transformed vacant lots into green spaces that included vegetable plots, sitting areas, playgrounds and flowers (Saldivar, 2004). The gardens help in building resilience: they are considered in many cases as sacred and where it is a taboo to dump trash. The solidarity and cohesion of the community created through community gardens allowed the residents to take action on other issues related to the neighborhood such as trash and crime, improving the quality of life.

2. Urban agriculture on buildings

There is recently a globally-expanding green roof and green wall industry, especially in developed countries.

a. Green walls

Green walls, also known as living walls or vertical gardens, are walls partially or completely covered with vegetation. They are an innovative food-production method that maximize production, especially in small areas lacking horizontal space. Some

systems have been developed in order to make structures lighter and more efficient. Some include a growing medium, such as soil; while others use new techniques such as hydroponics, (i.e. the practice of growing plants in a mineral nutrient solution without soil) (Figure 8).

Figure 8: Hydroponics system (Source: Carrot City)

b. Green roofs

Building roofs are potential spaces for creating productive rooftop gardens. There are different types of green roofs:

Extensive green roofs are have thinner and less numbers of layers, so therefore they are lighter, less expensive and low maintenance. This type of roof does not include an integrated irrigation system (Vermon, 2013)

Intensive green roofs can host heavier plant material since the growing media depths is increased and can range between 30 cm to 5 meters or more, depending on the loading capacity of the roof and the architectural and plant features that the building owner desires. In many cases, architectural accents such as waterfalls, ponds, gazebos, are integrated in this type of green roofs to provide recreation spaces and encourage

interaction between people and nature. Maintenance requirements are also more intensive.

Green roofs have different benefits. They reduce the flow of run-off into drainage systems, improve he thermal insulation properties of the roof, improves the climatic environment and can provide amenity spaces with wildlife benefits (ibid).

There are numerous design considerations to take into account when installing green roofs such as: roof holding capacity, access, existing use, building height, wind and sun exposure, maintenance and safety (ibid). In low income neighborhoods, roofs are often deteriorating or in a poor condition that it is almost impossible to hold intensive or extensive systems. Rather, whenever the condition permit, edible plants grown in upcycled containers, pots or on light structures assist in securing food for building residents.

c. Green balconies

Often balconies can also help residents in growing their food. Small spaces are used to grow edible plants for household consumption grown in pots.

3. Urban agriculture in the streetscape

In some cases like Amman or Nicosia, streetscapes are planted with fruit trees instead of ornamentals. They are managed by locals who take care of the maintenance and collecting the fruits.

Figure 9: Orange tree in Nicosia.Photo by Yaser Abunnasr

In conclusion, agriculture using green roofs, green walls and vacant land add environmental, functional and aesthetic dimensions to cities, especially in low income neighborhoods. These three strategies are often coupled with rainwater harvesting and re-use of organic waste.

D. Urban agriculture: Opportunities and challenges

Urban agriculture in urban dense low income neighborhoods presents both opportunities and challenges.

1. Opportunities:

On one hand, urban agriculture can have many advantages and benefits:

(1) Urban agriculture plays a major role in reducing food insecurity and poverty alleviation, and improving well-being therefore improving the livelihood in the city.

(2) The city shifts from a system of consumption based on an imported food system, to a system of local, possibly self sufficient sustainable production.

(3) Urban agriculture is not only about growing food but also about growing communities. Urban agriculture is becoming a catalyst for community building in cities and "contribute to the creation of resilient urban neighborhoods" (Orsini, 2014, p.789).

(4) Beyond the benefits associated with food production and the natural environment, community gardening is claimed to improve human well-being.

2. Challenges:

On the other hand, urban agriculture can face future challenges and threats:

(1) Real estate dynamics: "Agriculture is threatened by real estate speculative mechanisms, the strength of urban expansion, and the competition for limited resources" (Valette, 2012, p.7). This will impact the access and use of vacant lots that have potential to be productive lands.

(2) Life cycle of urban agriculture: Real estate has been and will remain a major driver of the economy in cities, and might constitute a barrier to the development or implementation of planning regulations that would take urban agriculture a step beyond a temporary use of space. This might effect the timeframe of agriculture varying between a temporary or permanent intervention in the city.

(3) Other challenges include financing, creating local stakeholders and creating incentives for urban agriculture.

(4) According to the Resource Center on Urban Agriculture and Food Security (RUAF), many factors limit urban agriculture's popularity: rising land value and population density in cities; industrialization of food production; and improvements in transport, refrigeration, processing, and storage of food. Compared to rural environments, the possibilities of producing food in cities are limited. Its potentials and dimensions can be grouped under three categories: the social, economic and environmental.

(5) Other limitations include the need for effective basic infrastructure in urban areas to protect public health and the environment, as well as training and information exchange and generating awareness for example about what and how to grow. Added to that the economic constraints on food production and consumption, as well as the "public will" to protect agricultural spaces or to integrate them into the urban project (Valette, 2012, p.7).

E. The planning and policy dimension of urban agriculture

In developed countries, public policies assist urban agriculture's contribution in creating sustainable and resilient cities (Pearson, 2010). Many urban agriculture projects

are launched in collaboration between different parties, through lease agreements with public agencies and private landowners. Planning tools used include:

- *Expropriation of land for public interest/ Public procurement:* it is the process by which government departments or agencies purchase goods and services from the private sector
- *Land banks:* These are banks that provide loans for the purchase or rent of land, especially by farmers[3].
- *CSA (Community-supported agriculture):* CSA refers to a network of individuals, who financially support one or more local farms where their food is grown, making them stakeholders or members of the system. In this model, growers and consumers share the risks and benefits of food production. Members receive a certain share of the produce each week throughout the growing season that can be retrieved from a local community site. The "farm to school movement" is an example of CSA that allows local farmers to supply schools and colleges' cafeteria fresh food (Lteif, 2010)

In contexts of conflict and where the impact of the local authorities is low, some main questions arise when thinking about the planning dimensions for open spaces and more specifically for urban agriculture as a strategy.

F. Urban agriculture and sustainable livelihoods: challenges, opportunities and research gaps

Some topics related to urban agriculture research in the literature remain under searched. I mention below some knowledge gaps:

[3] www.ruaf.org

- Current research from developed countries has been focusing on urban agriculture as a high end product in high income communities. Applicability of urban agriculture in low income neighborhoods, informal settlements and in areas of transience has been under searched.
- There are also gaps regarding 'the opportunities for urban agriculture to impact urban form, especially in design and planning" (Pearson, 2010, p.9). There are many studies on urban agriculture, however they are poorly connected to urban studies (Sabatier, 2007) and often 'compartmentalized, especially between urban and agricultural research'.
- 'The literature on sustainable cities usually ignores the opportunities for urban agriculture to contribute to urban sustainability, more specifically concerning the social, economic and environmental attributes of urban agriculture' (Pearson, 2010, p.7).
- There are knowledge gaps regarding the institutions which govern and manage urban agriculture (Pearson, 2010), such as municipalities and community groups.

CHAPTER III

RESEARCH METHODS

This chapter elaborates on the methods of data collection and analysis that were at the core of this thesis. The research extended over a period of a year (April 2014- April 2015) and the methodology followed 3 broad lines of inquiry: (1) an archival research looking at agricultural practices in Bourj Hammoud and its vicinity, (2) a review of the literature on urban agriculture and (3) data collection through field work. Field work was divided into a physical survey complemented by a questionnaire in order to help me profile the population and its needs and articulate accordingly a design strategy. The methodology for each section is elaborated below.

A. Case study profile (Chapter IV)

Based on literature and archival research, I start by an introductory overview of the urban and historical context of the neighborhood, including historical agricultural practices, and planning dimension.

B. Case study analysis (Chapter V)

1. Agriculture in Nabaa neighborhood:

Historical and current agricultural practices were documented based on archival research focusing on agricultural activities in Nabaa, photographs, aerial photos, historical maps as well as direct observation.

2. Social analysis:

In order to profile the population and its needs and articulate accordingly a design strategy, livelihood in the neighborhood was documented through direct observation and informal talks with residents that were complemented by a questionnaire. It also helped in understanding the different communities coexisting together and their relationship to the neighborhood.

a. Detect community practices

Through field work and observation, agricultural and non agricultural green practices were documented:

- Local typologies of existing green practices (such as planting on balconies, on the roofs, or in pots along the streets) were identified. The different vegetation types that exist in the neighborhood's open spaces such as streetscapes, agricultural lands, or underdeveloped land were also mapped.
- The following agricultural food system practices were mapped:
    - Remnant agricultural lands in the neighborhood and its surrounding
    - System components of the local food system: Mapping location of fruit and vegetable street vendors, and existing shops.

b. Understand livelihoods

The livelihood variables that were investigated in the questionnaire included defining the consumption of local food amounts within the neighborhood. This allowed the understanding of food consumption practices and socio economic dimension of the neighborhood. A total of 30 questionnaires appended at the end of the thesis were administered to three different users: neighborhood dwellers, push cart vendors and fruit

and vegetables shop owners. The participants were asked to participate based on a direct approach and a random selection (Singleton, 2010) within the neighborhood's study boundary defined in chapter IV. The questionnaires were spread evenly along the neighborhood and their aim is to get a glimpse of the practices and interests of the people in the neighborhood. The different users informed me about the average frequency, types and quantities of fruits and vegetables that are being sold or consumed in the neighborhood. The questionnaires also helped in determining community needs as well the access to available services in the neighborhood such as food sources and open spaces. Some questions measured the interest and willingness of people to produce their own food and access productive shared spaces. In addition to the questionnaire, direct observation and informal talks with residents, the municipality and working NGO's in the neighborhood were conducted.

3. Physical urban analysis:

The physical analysis of the neighborhood was based on field work: Mapping its physical condition using photography, documenting available remaining unbuilt open spaces, their current uses and zoning regulations, mapping the existing vegetation layer, as well as identifying permanent and temporary services in the neighborhood.

a. <u>Mapping existing services</u>

Fieldwork is a physical assessment that includes mapping the physical condition of the neighborhood using maps and photography to documenting roads, buildings, available built and unbuilt open spaces and their current function and extent of use, as well as mapping the existing vegetation layer and the existing permanent and temporary services. Permanent services include educational institutions such as schools,

NGO's, religious institutions, and existing planned open spaces. Temporary services include mobile fruit and vegetable market, and the garbage collection network.

b. Zoning, prospective projects and tension to change

Understanding the existing zoning of the neighborhood is crucial. An analysis of the susceptibility to change of remaining open spaces, closely related to ownership, size and location of land, will provide a framework for intervention and a baseline for suggesting strategies.

C. Mapping and analyzing unbuilt lots

1. Map potential surface areas for urban agriculture

Mapping potential surfaces that are possibly usable for urban agriculture is critical to developing the urban agriculture network in Nabaa. All potential surfaces are first mapped then analyzed for suitability as discussed in later sections. Potential surfaces in the neighborhood and its peripheries were categorized into the following categories:

- Buildings: the vacancy of educational and religious institutions building roofs were mapped using aerial photograph to detect if they can be used for the intervention. The selected institutions have the potential to gather people on their roof for shared practices.
- Streetscapes: Potential streets for intervention were identified. The selection included narrow sidewalks, old pedestrian networks and main streets.
- Open space on land:

(1) Open spaces remaining within built lots (interstitial spaces and leftover land in built lots) were identified. Spaces located inside blocks that are only accessible to residents and often used for storage or for placing water tanks were disregarded.

(2) Unbuilt lots were identified, surveyed and mapped.

2. Method for analyzing potential open space on land

In order to identify open spaces on land that are suitable for an urban agriculture intervention, three criteria were analyzed: susceptibility to change (Figure 99), suitability for urban agriculture (Figure 100) and the potential for planting (Figure 101). Since unbuilt plots have more potential than leftover spaces remaining within built parcels, and to narrow down the analysis, a detailed analysis using the intersect analysis tool of Geographic Information Systems (GIS) software was conducted only on unbuilt lots. This analysis phase will help in building components for creating different strategies for urban agriculture. The method for analysing unbuilt lots is described below.

a. Measuring the susceptibility to change

Susceptibility to change is used to broadly indicate the likelihood that an area will change in the near future. Change can include new development on previously undeveloped land, redevelopment, change of use, or intensification of use. The susceptibility to change for each unbuilt lot was analyzed through identifying 3 variables: Ownership type, minimum buildable size, and type of prospective projects as

described in Table 1 below. The diagram shows the table of variables and the procedure conducted to achieve the analysis.

	Susceptibility to change: Criteria for selection/ variables			
	Ownership type:	**Minimum buildable size:**	**Prospective projects:**	**Susceptibility to change:**
Unbuilt lot	*(1)Private* *(2) Public*	*(1)Less than zoning* *(2)More than zoning* Minimum buildable size: Zone B2=250 m^2 Zone B2.1=250 m^2 Zone D=200 m^2	*(1)None* *(2)Projected for the future* *(3)For Sale* *(4)Under construction* *(5)Lot assigned to eminent domain* (تخطيط)	*(1)High* (2)*Medium* (3)*Low*

Table 1: Criteria for susceptibility to change

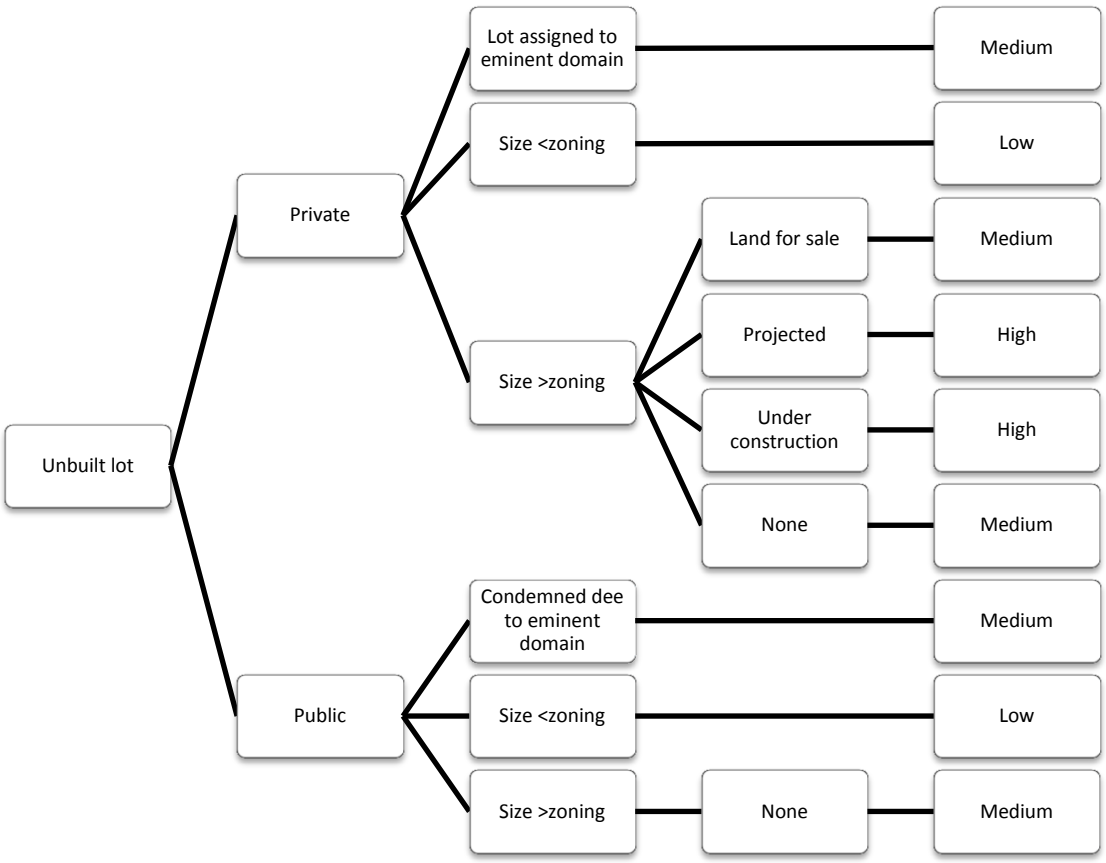


Figure 10: Diagram showing the selection criteria for susceptibility to change

Ownership: Public ownership refers to land falling under the "public domain" realm, i.e. belonging to a municipality, state or other agency such as the Council for Development and Reconstruction (CDR). Private ownership includes lots owned by individuals, religious and educational institutions.

Projects projected for the future: These are projects that are currently getting building permits.The land is therefore expected to be built soon.

b. Assessing suitability for urban agriculture

Suitability analysis was first introduced by Ian McHarg in his book "Design with nature" (1969). McHarg's method involved superimposing layers of geographical data (e.g. environmental and social factors) so that their spatial intersection can be used in making land use decisions. I use this method to assess the suitability of unbuilt lots for urban agriculture by intersecting the extent of use and function. Unused lots are vacant lots with no current designated use. Figure 11 shows the table of variables used and the diagram of the procedure conducting to achieve the analysis.

	Suitability for urban agriculture: Criteria for selection/ variables		
	Extent of use:	**Function:**	**Suitability for urban agriculture:**
Unbuilt lot	(1) Fully used (2) Partially used (3) Unused	(1) Playground (2) Parking (3) Storage/Buisness (4) Remnant agriculture (5) Road median (6) Sports stadium	*(1) High* *(2) Medium* (3) *Low*

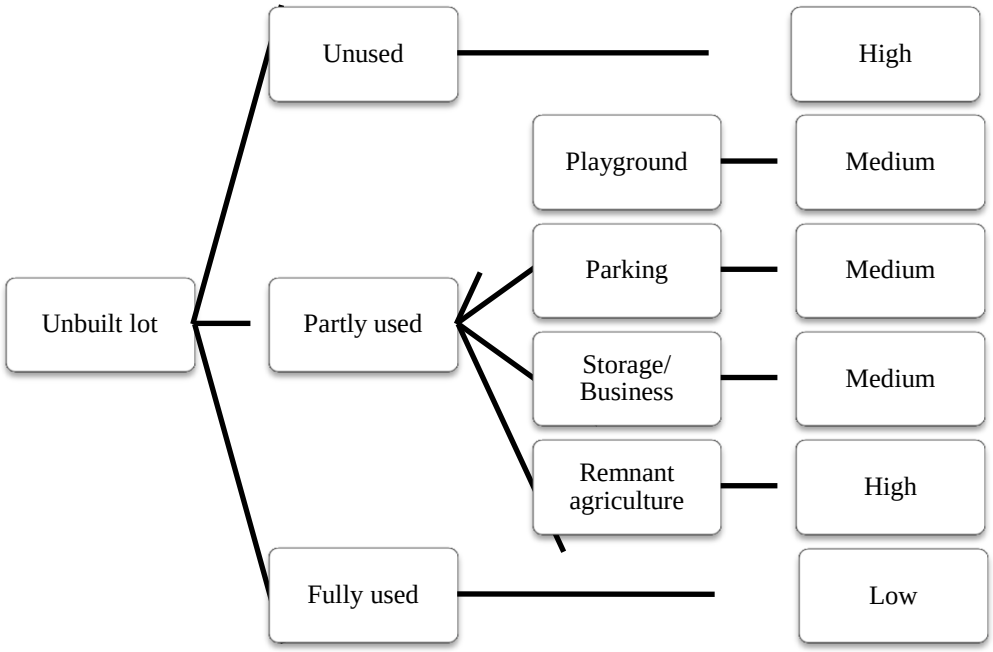


Figure 11: Diagram showing the selection criteria for suitability for urban agriculture (based on extent and type of land use)

c. Assessing potential for planting

Potential for planting was analyzed after identifying the surface area of the lot. Other criteria such as soil availability and type of existing vegetation on land are taken into consideration in the proposed strategies but not taken into account here. Figure 12 shows the selection criteria for the potential for planting on land for assessing the baseline for production.

	Potential for planting: Criteria for selection/ variables	
Unbuilt lot	**Area:** (1) 100 > m^2 (2) 50-100 m^2 (3) 0-50 m^2	**Potential for planting (productivity):** *(1)High* *(2)Medium* *(3)Low*

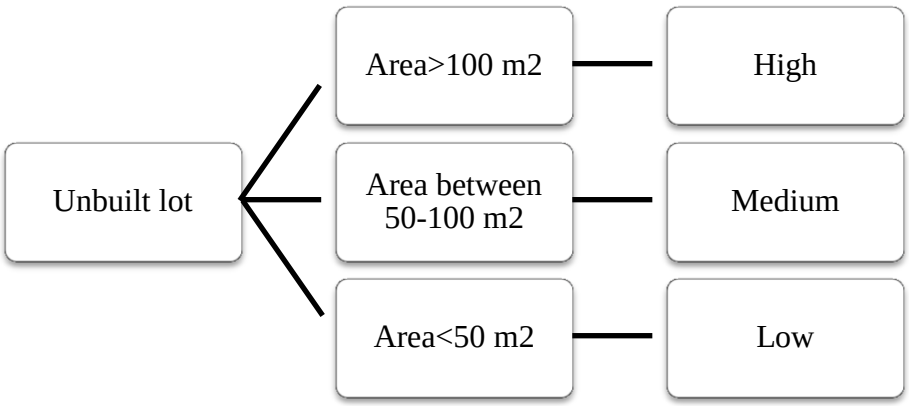


Figure 12: Diagram showing the selection criteria for the potential for planting on land for assessing the baseline for production

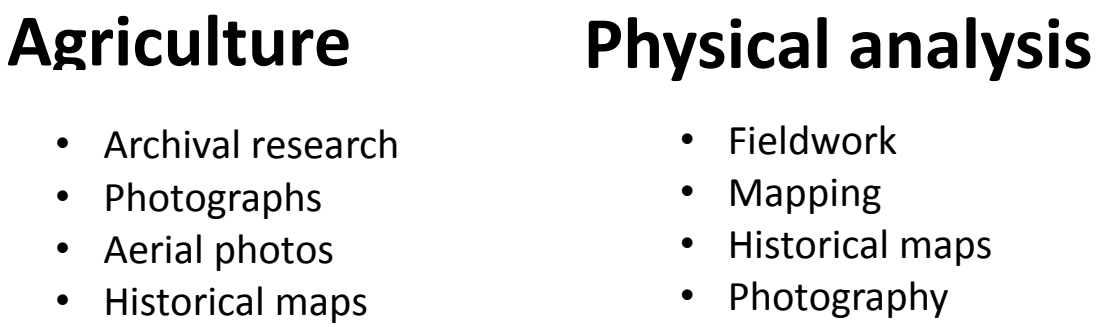


Figure 13: Summary of research methods used

Physical Analysis+ S
Suitability ana

Some factors that impact the potential for planting but were not included in the analysis due to the scope and scale of work are elaborated below:

- **Sun exposure:** This thesis does not analyze sun exposure of the potential surfaces studied such as unbuilt lots since no data was available on building heights and surveying building heights of all the studied plots was beyond the scope of this research. The sun exposure criterion is assessed on the quantity of light received throughout the day. However I assumed that lots that are at the periphery are less dense hence they have more sunlight and are more suitable for heavy production than the lots inside the neighborhood. Areas with fewer buildings surrounding them and low building heights are more prone to have larger amounts of sunlight. It is also important to note that artificial lighting can be provided in case of low sun exposure.

- **Water:** I recognize that water is an important ingredient for urban agriculture. Although this thesis does not focus on the issue of water, I have identified some historical existing water sources and their locations (artesian wells, water springs and right to water). Further investigation would be needed to know if they are still present today. Other sources of water can be used from the government, municipality (Water tower), or through rain water collection (see also intervention chapter)

- **Soil availability and existing vegetation cover:** Existing soil and vegetation on land have been taken into consideration in the proposed strategies but not in the open space analysis. The presence of vegetation on soil indicates some level of a healthy soil that can be assumed suitable for urban agriculture use. Soils will require amendments, as they are in an urban context, to bring them to usable level of soil health.

CHAPTER IV

CASE STUDY PROFILE

Nabaa neighborhood, Bourj Hammoud[4]

A. Location and demography:

1. Bourj Hammoud

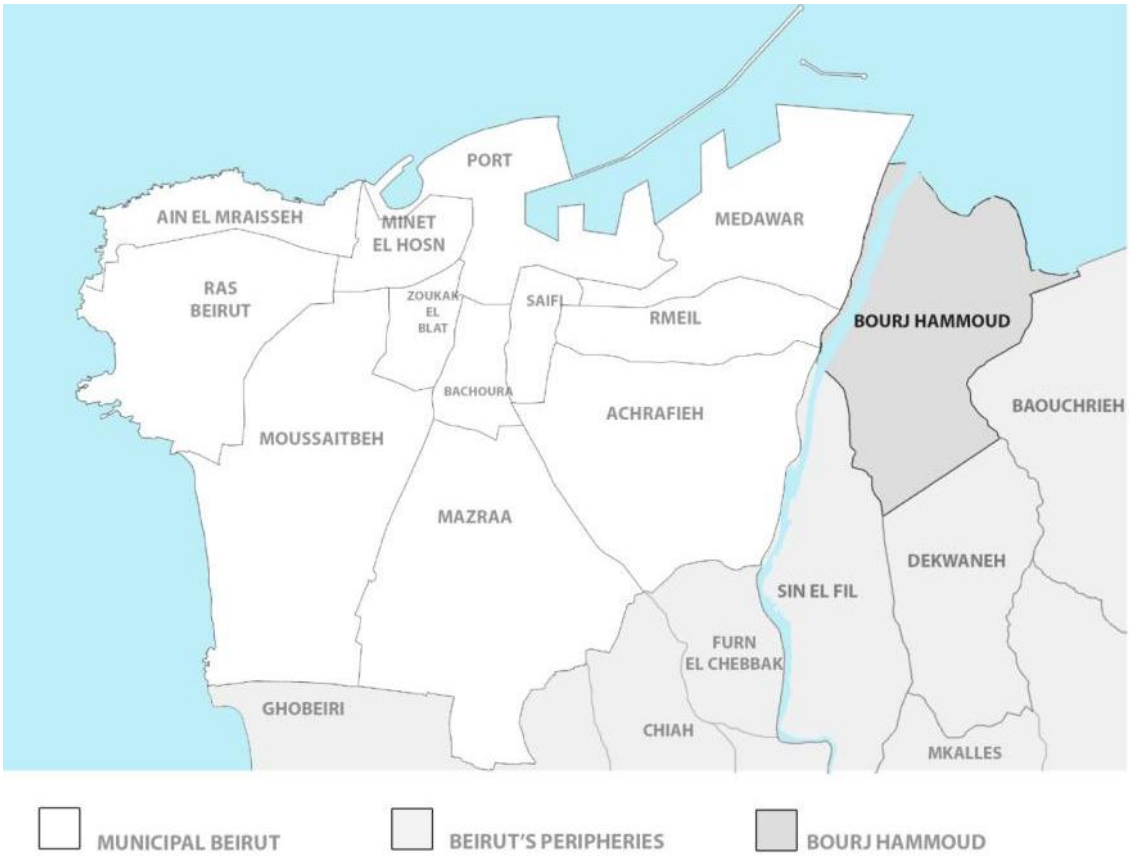


Figure 14: Administrative boundaries of Bourj Hammoud within the surrounding suburbs municipalities

Bourj Hammoud is located in the North Eastern suburb of Municipal Beirut and part of Greater Beirut (Figure 14). The area belongs to the Metn Caza in the Mount

[4] The information presented in this thesis about the Nabaa neighborhood is based on a research currently being conducted by Professor Mona Fawaz. All base maps and aerial photographs that are at the core of producing the analysis were provided by Dr. Fawaz.

Lebanon province, and is separated from the capital by the Beirut River. In 2007, it had a population of 150,000 over an area of 2.5 km², making it one of the densely populated cities in the Middle East.

2. Nabaa neighborhood:

Nabaa is a neighborhood within the jurisdiction of the Bourj Hammoud Municipality (Figure 14). It is a dense low-income neighborhood, home to a diverse population. In the absence of an official population, the number is estimated today to have increased from 22,000 inhabitants in 2012 to around 26000 inhabitants in 2014 after the Syrian crisis.

3. Delimitating Nabaa's boundaries:

The boundaries of Nabba are an example of how conceived administrative boundaries defined by governments often fail to overlap with perceived and lived boundaries redefined and interpreted through people's practices.

Nabaa's boundaries as conceived:

Administravely, Bourj hammoud is divided into 10 zones or administrative subunits. Many of these zone names reflect the name of early Armenian settlements, in which people of the same geographical origin generally gathered such as Marach, Sis, Zeitun or Adana. Officially, Nabaa is the administrative zone highlighted in Figure 15, located on the periphery towards the South of Bourj hammoud's official boundaries.

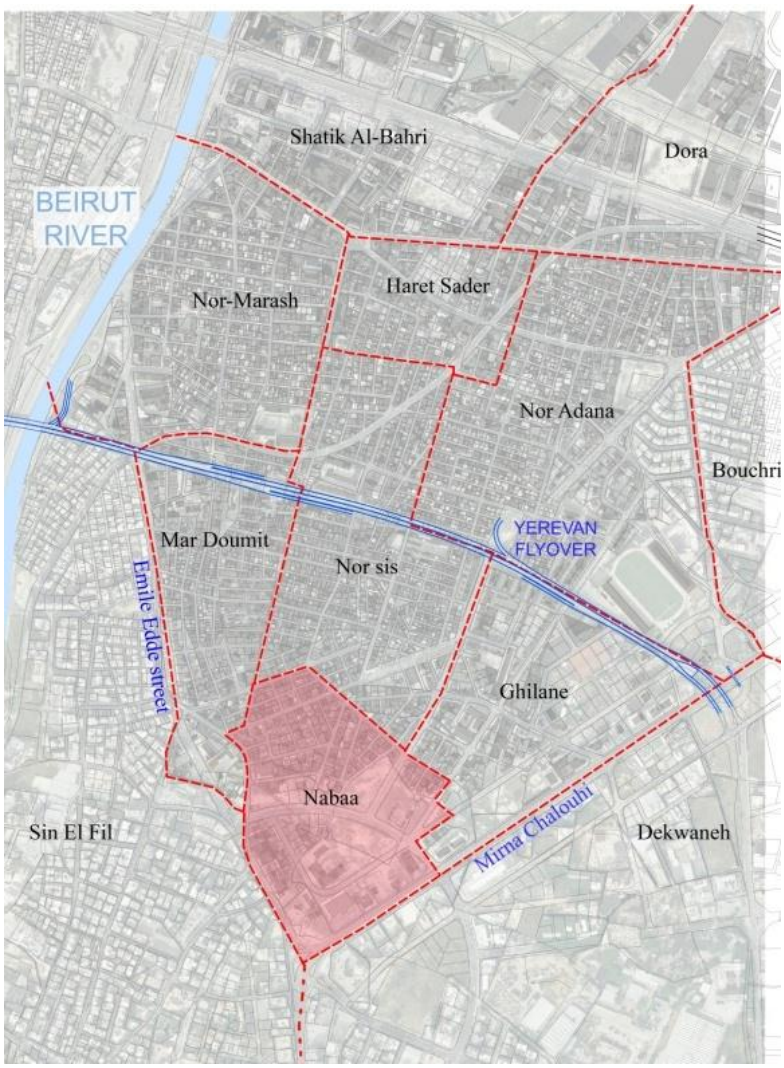


Figure 15: Bourj Hammoud zone division as conceived.

Nabaa's boundaries as perceived:

Nabaa as perceived by its residents is the "lower Bourj Hammoud". It is often described a "dense deteriorated settlement growing on Beirut's peripheries", delimited northward by the Yerevan Flyover and southward by Mirna Chalouhi Boulevard and Emile Edde Street, extending over an area of 0.5 km^2. This perceived boundary of the neighborhood will serve as a limit for my study area.

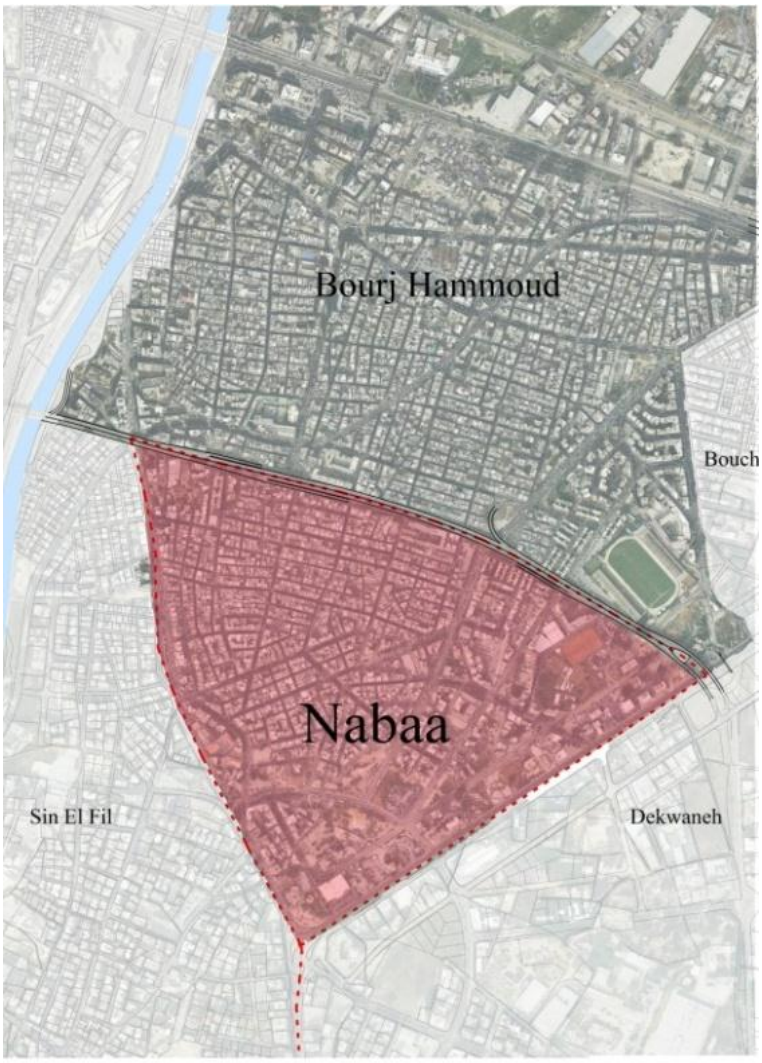


Figure 16: Nabaa as perceived by the residents.

B. Understanding the historical context: a neighborhood in continuous flux

Bourj Hammoud is in continuous flux. The history of its population counts numerous migration movements and has been witnessing an increasing scale of urbanization. Rural to urban migration (internal migration) and immigration (external migration) related either to compulsory or voluntary displacements are the two major migration fluxes in Bourj Hammoud that will be highlighted to help understand the

general social, spatial and economic dynamics of the neighborhood. In this section I trace briefly the neighborhood's history and its evolution.

1. From swamp to agriculture

Prior to the 1920's, Bourj Hammoud was swampland and marshes (Figure 17) that was then developed into agricultural land. Even the toponymy of "Bourj Hammoud" and "Nabaa" revolve around previous agricultural practices. Bourj Hammoud was named after the "Hammoud tower" (Figure 18), a two floor building with an attic owned by Emir Hammoud, built to watch over the laborers in his agricultural fields[5]. Furthermore, the name of Nabaa[6] was given to the neighborhood because of its richness in water springs, around which the Nabaa farming settlement at a close proximity to the Beirut River was built around in the 18th and 19th century (Khayat, 2002).

[5] Source: Bourj Hammoud municipality

[6] Nabaa or نبعة in Arabic is a synonym of a water source

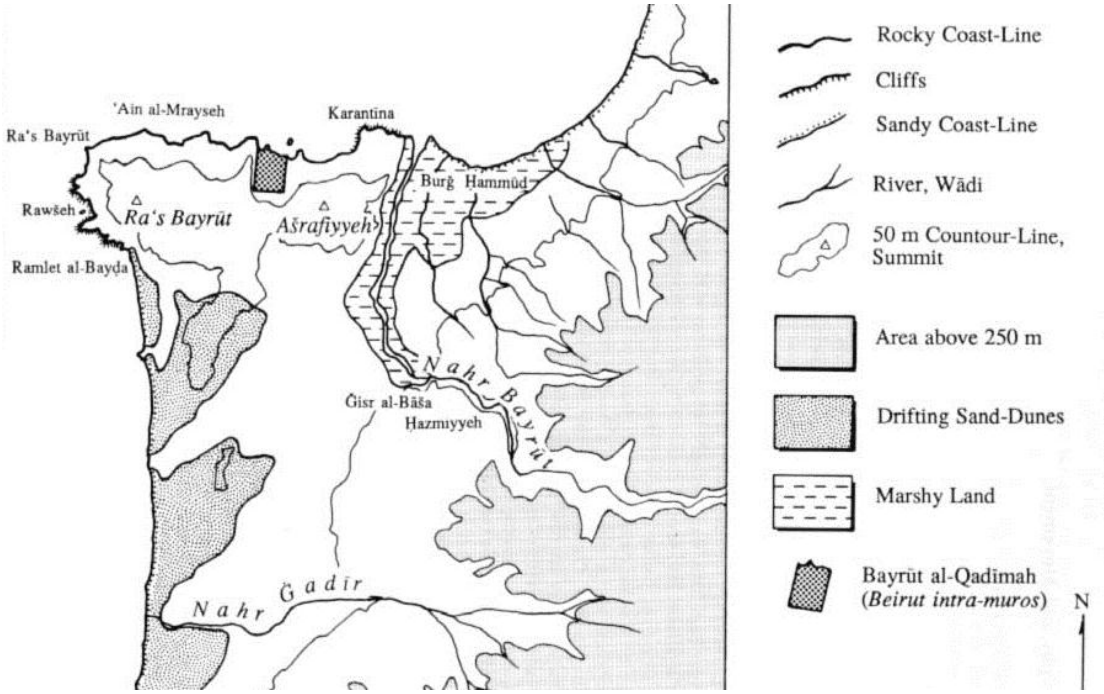


Figure 17: Marshy land in Bourj Hammoud. Source: Davie, 1984

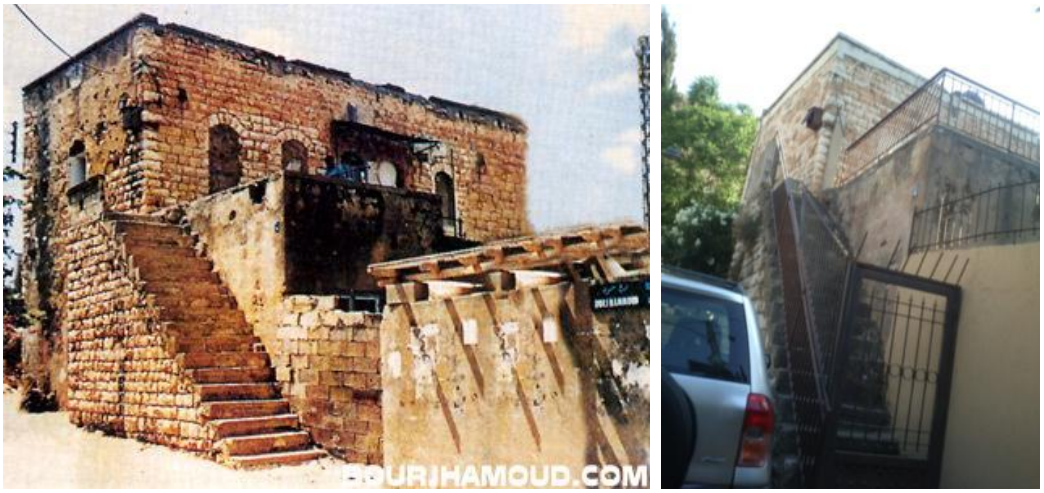


Figure 18: Hammoud tower. Source: www.Bourjhammoud.com. and author

This was distinctive architecture at the time from the modest farmhouses. The building is still present near Mar Doumit Church and is owned as Church Wakf number 246

2. People and places

The farming settlement shifted from very few farmhouses and fertile agricultural fields in the 1920's into a place for refuge for Armenians brought by the French during the 1915 Armenian genocide. They were given the permission to populate the area, by setting up shacks. In the following years, more Armenians joined the Armenian dominated community. Later during the 1940s-50s, Muslim Shiite rural migrants who arrived to the city from South Lebanon and the Beqaa looking for employment in what was then the city's main industrial suburb settled in Nabaa, as it was then very thinly populated. However the outbreak of the Lebanese civil war in 1975 lead to a quick depopulation caused by the forceful departure of the Shiite population (Massabni, 1977) and its replacement, within the following months, by Christian refugees who were then fleeing other areas of Lebanon. Later, in the mid-1990s, the policies of the Ministry of the Displaced led to another population swap as they evicted Christian families who had squatted the neighborhood for over 20 years and returned properties to their pre-war owners. Armenians continued to sell their houses to non-Armenians, and Lebanese Shiites have begun moving back, joined by the country's foreign workers; from Egypt, Sri Lanka, Ethiopians to Syrian refugees who shuttle daily between their workplaces in wealthier neighborhoods and Bourj Hammoud, where the rents are noticeably lower than elsewhere in Greater Beirut. More recently during the 2006 war, Bourj Hammoud continued to host in its churches, schools and other complexes refugees who were given shelter. Today, Bourj Hammoud's "misery belt" continues to host a diversity of population, especially Syrian refugees, after the Syrian war.

The aerial photographs show the evolution of the historical fabric of Nabaa from the 1920's till 2008 (Figure 19).

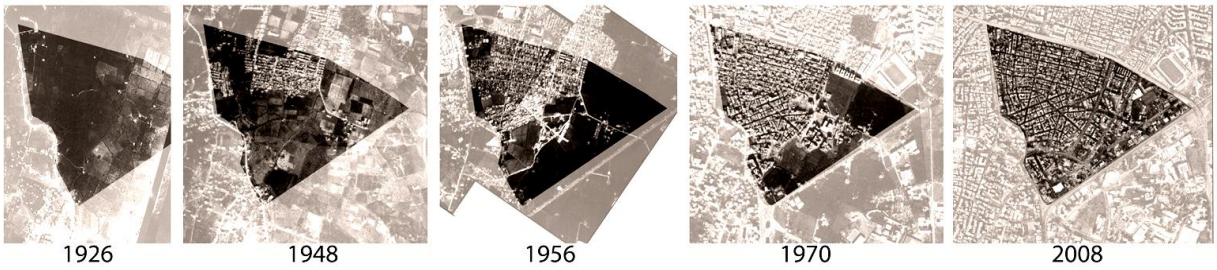


Figure 19: Historical Evolution of Nabaa.
(Source of aerial images: Lebanese Army-Geographic affairs, provided by Dr. Mona Fawaz)

C. The planning dimension of Nabaa

1. Subdivision and development

The subdivision of larger agricultural lots for urban use during the past century have practically eliminated Nabaa's agricultural history. Nabaa shifted from 50 lots to more than 1000 lots in 60 years (El Alam, 2014). With the increase in population and in the prices of land, the area went under several subdivisions, mainly during the 1940's-1950's when agricultural lots (up to 30,000 m^2) were subdivided into small residential plots (50-100 m^2), such as the case of lot 161 illustrated in Figure 21. In the absence of building and urban regulations, these building developments were not illegal. Furthermore, during the 1960s, many of these buildings were developed incrementally by acquiring building permits that were registered in the Municipality of Bourj Hammoud. Today, most property owners prefer to either sell or rent out their property, rather than settling back in Nabaa (Samaha, 2015).

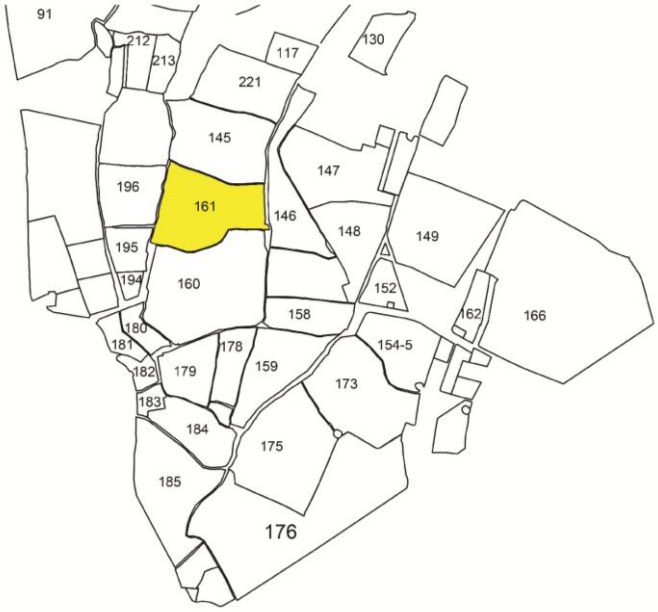


Figure 20: Reference location of Lot 161 before subdivision

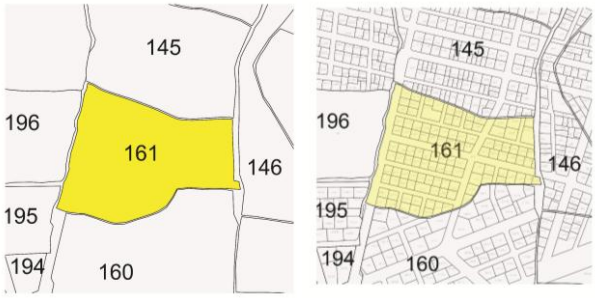


Figure 21: Lot 161before subdivision in the 1940's after subdivision today

Some lots such as the previous Aghapios camp (lot number 196) remain unsubdivided. Lot number 196 is owned by the municipality. It remains among the largest lots in the neighborhood, having an area of 9 388 m^2, along with lot number 175 (area of 21 823 m^2) and lot 176 (remaining area of 16 492 m^2 after being reduced in size after being cut by a road) (Figure 22).

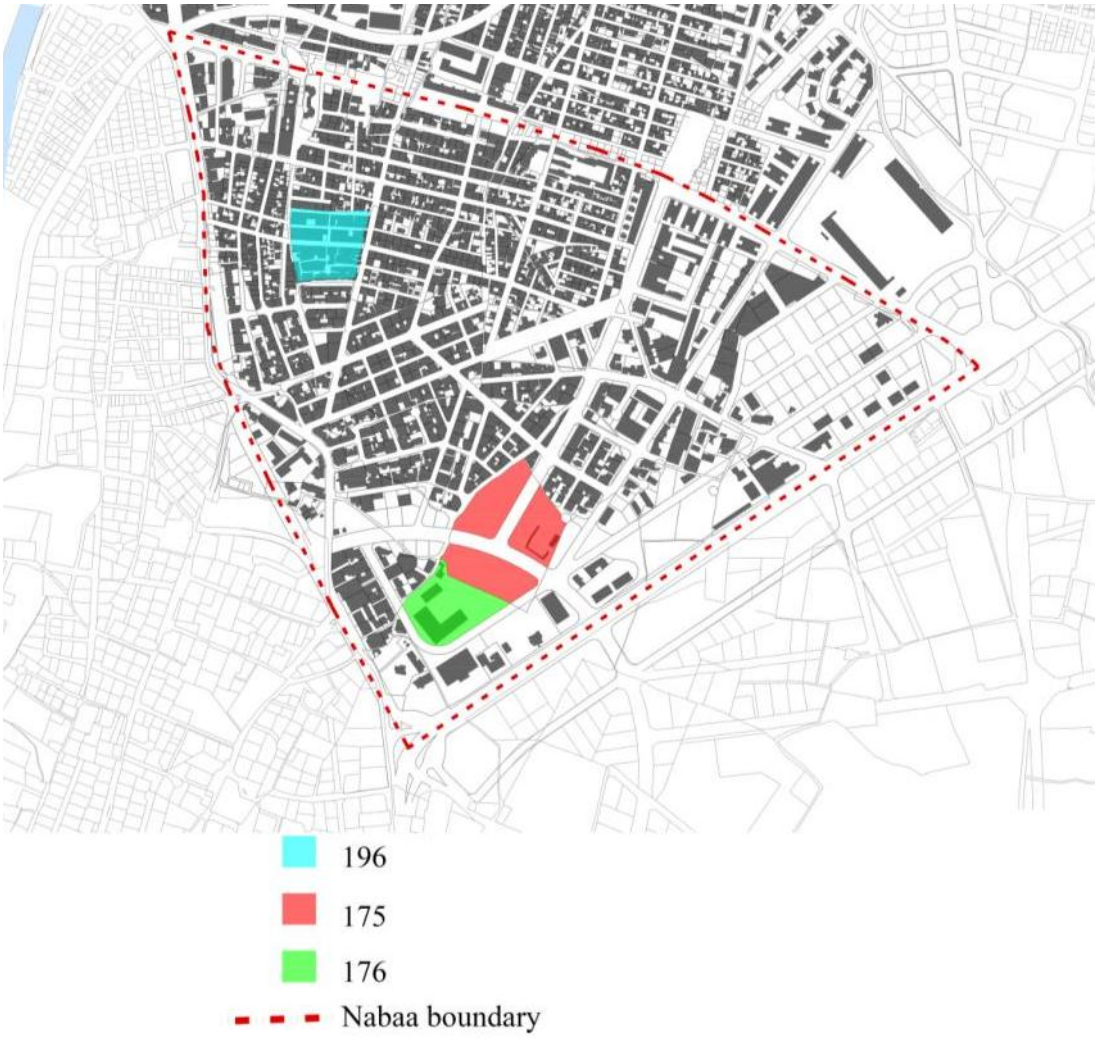


Figure 22: The three largest lots in Nabaa

2. Ecochard's plan

There was no focus on planning Beirut's suburbs until 1961, during the Chehab mandate when Lebret's IRFED planning team outlined the necessity of decentralizing the capital. The French urban planner Michel Ecochard (1905-1985) was commissioned to draw a master plan of the suburbs also known as *The Plan Directeur de Beyrouth et des Banlieues (1963),* going beyond the mandate of the governmental cities. The objective was to set up a plan for governmental cities as well as to connect the country

and its peripheries to the capital by linking new cities to the center by a network of freeways. However, only parts of Ecochard's master plan were adopted while other parts remained only on drawings, have been halted or postponed, among them a projected highway[7] whose trajectory cuts through the periphery of Nabaa (Figure 23).

This highway is part of a circulation network that was planned but never executed. The government placed a hold on the lots crossed by the projected highway as part of the incomplete expropriation process. Landowners had their lands frozen (i.e. land owners cannot build or develop their land until revisions are completed) pending the construction of the highway and were not given any compensation[8]. In October 2008 a decision was taken by the council of ministers to cancel part of the projected highway. In February 2010, Nabil Nicolas, member of parliament for Metn distict which Nabaa is part of, called for a meeting with the lot owners in order to look for alternative solutions and to negotiate the possibility of the owners to manage their lands[9]. The problem is still pending and there is still no solution to date for those lots. This also explains why this part of Nabaa hasn't been developed yet. In this thesis, the lots crossed by the projected highway are considered as private lots.

[7] Also known as اوتوستراد ضواحي بيروت or الاوتوستراد الدائري
Decree: 1997-6-9 مرسوم رقم 5821 تاريخ: 27-10-1966 اوتوستراد ضواحي بيروت معدل بالمرسوم رقم 10387 تاريخ:
[8] http://www.alakhbar.com/node/176394
[9] https://now.mmedia.me/lb/

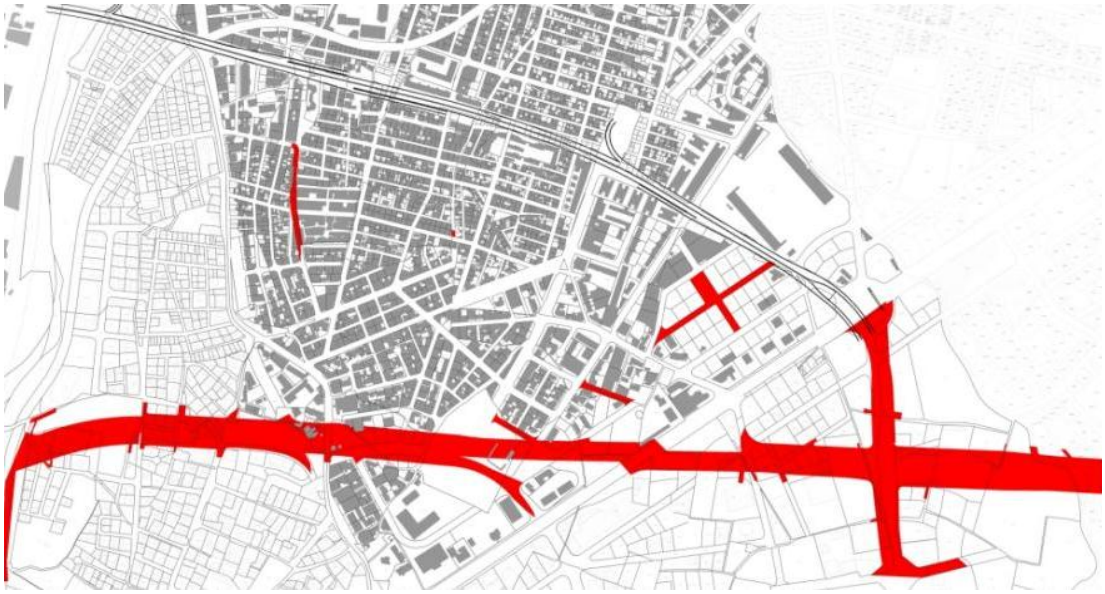
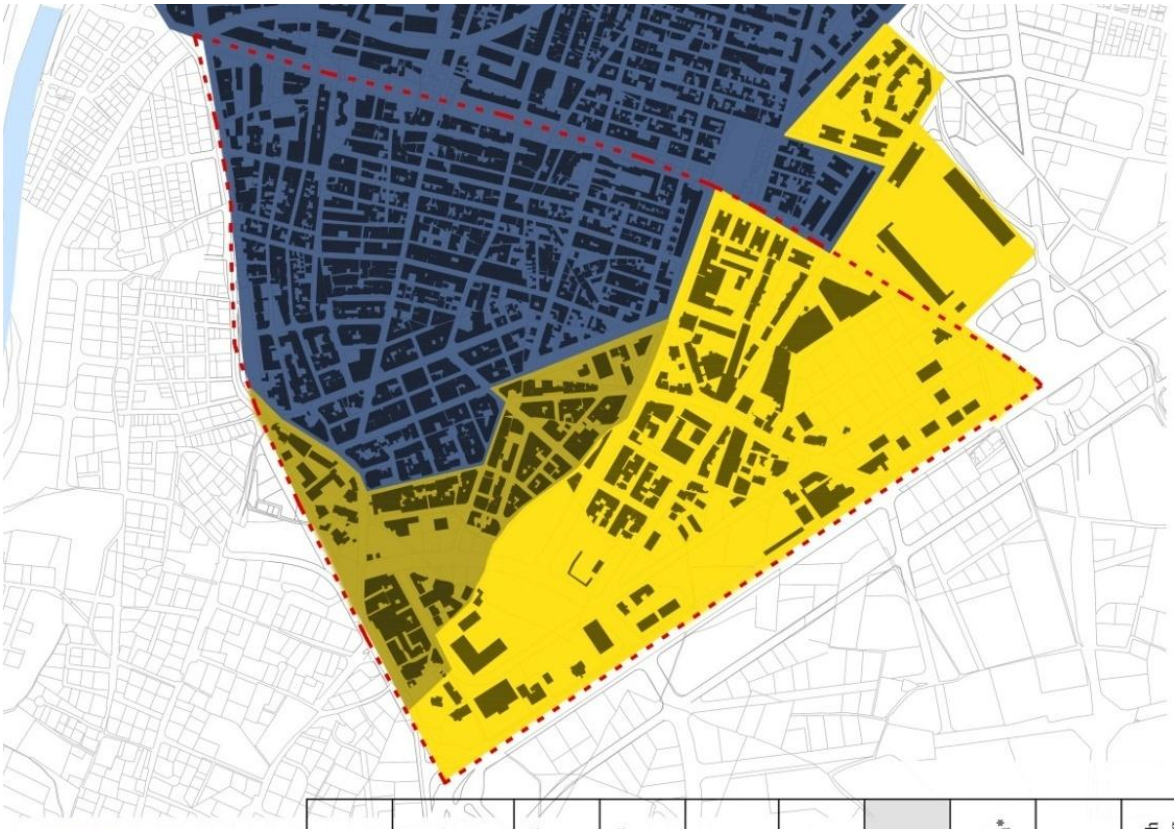


Figure 23: Projected roads in Nabaa

3. Zoning

The building code follows the 1954 zoning guidelines elaborated on in the general master plan for the suburbs of Beirut[10], putting restrictions on the way that land can be used. Nabaa is divided into 3 zones (Zone D, Zone B.2.1 and Zone B.2), mixed between residential-commercial and industrial commercial. Zones B2 and B.2.1 have a minimum buildable size of 250 m^2 while Zone D is 200 m^2 (Figure 24). This zoning will help in identifying unbuildable lots that could be potential for the elaboration of the intervention

[10] المخطط التوجيهي العام لضواحي بيروت



Zone	Allowed Uses	Allowable maximum building footprint as % of land area	Allowable maximum built areas as % of land area	Set backs	Maximum allowable building height	Minimum Buildable parcel size*	Minimum Buildable parcel width and depth*	Minimum size for parcelling	Minimum parcel width and depth for parceling
D	Residential commerce	50%	2%	-	-	200m^2	8m	400m^2	15m
B2	Residential commerce	40%	2%	-	-	250m^2	10m	600m^2	16m
	Industry commerce	50%	2%	-	-	250m^2	10m	600m^2	16m
B2-1	Residential commerce	40%	2.2%	-	-	250m^2	10m	600m^2	16m

Figure 24: Bourj Hammoud Zoning

4. The municipality

Bourj Hammoud which was at first part of Jdeideh and Sadd al-Bushrieh, became an independent municipality in 1952 is now member of the Metn-North union of municipalities (اتحاد بلديات المتن). Bourj Hammoud municipality have been working hard on public work projects, infrastructures and renovated pedestrian streets which

have helped in improving Bourj Hammoud's services in the “upper area” during the last few decades. Residents of Nabaa however complain that their neighborhood have been absent from the works of the municipality.

CHAPTER V

ANALYSIS

In order to understand the evolution of Nabaa through time and in space, a review of the historical agricultural practices, as well as an analysis the social and physical dimension of the neighborhood was conducted based on the methods described in chapter III.

A. Agriculture in Nabaa neighborhood: Extension of settlement area and encroachment of green space

In the 1920's, the neighborhood's natural resources favored agricultural practices. Fertile soil and abundant water were at the core of fruit and vegetable production. The neighborhood's topography (Figure 25) helped in shaping the water network (Figure 26) used for irrigating agricultural fields. The water network becomes denser in the lower terrain.

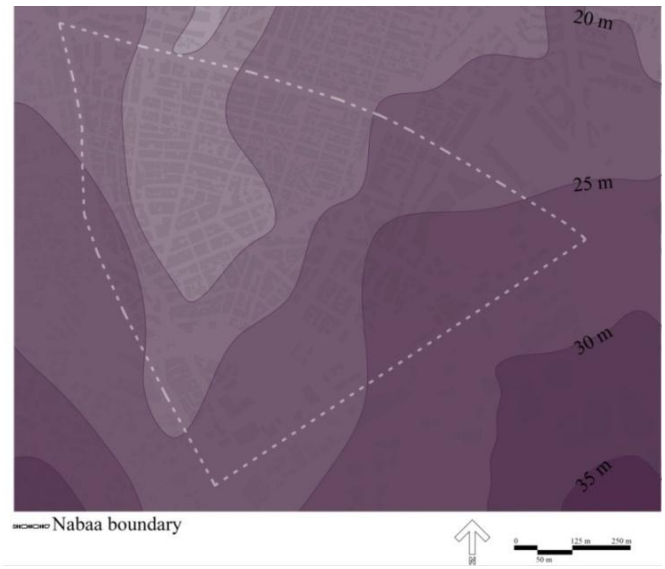


Figure 25: Topography

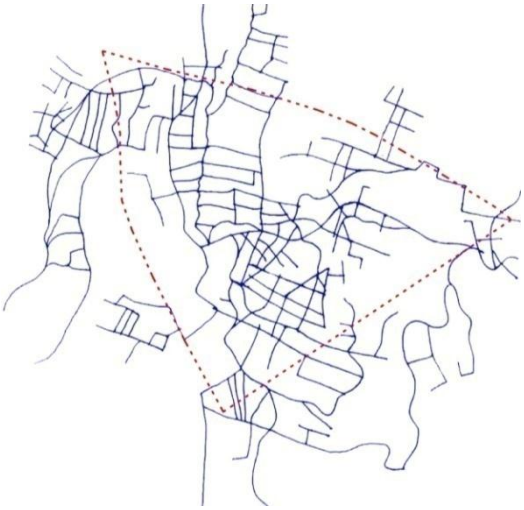


Figure 26: Water network in the 1920's

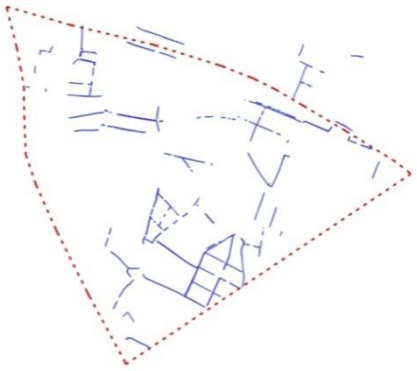


Figure 27: A fragmented water network today

The water network shaped the forms and patterns of the agricultural lots while the old pedestrian network shaped lot boundaries. Both water and pedestrian networks has disappeared today by the effects of urbanization. Only few narrow streets that were once part of the pedestrian network remain. They are highlighted in yellow in Figure 28.

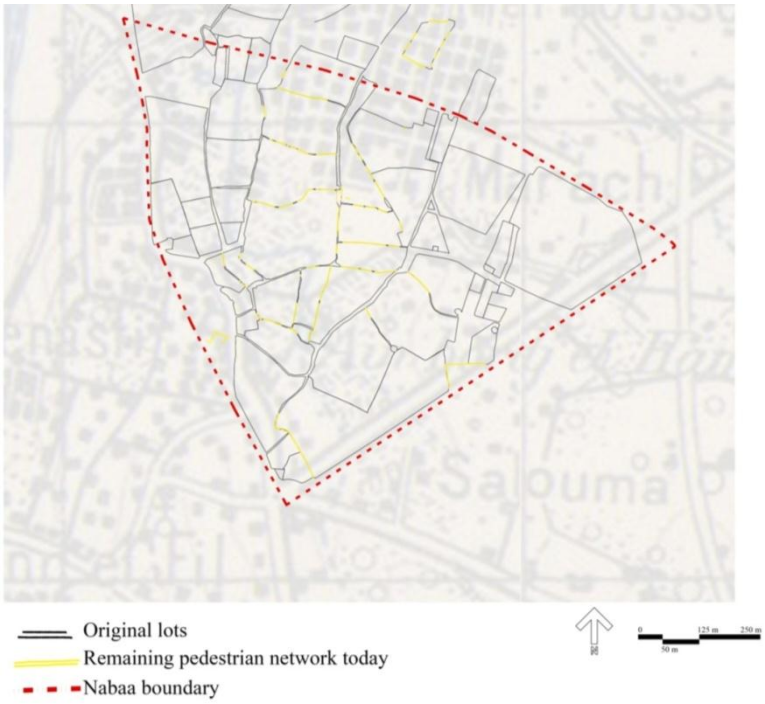


Figure 28: Lots boundaries defined by a pedestrian network in the 1920's. What remains of the network today is highlighted in yellow.

Historical sources of water (water wells and water springs) are not visible in the neighborhood and most probably most of them have disappeared. Only a water tower belonging to the municipality is still present and functioning and has been recently painted by an NGO (Figure 30).

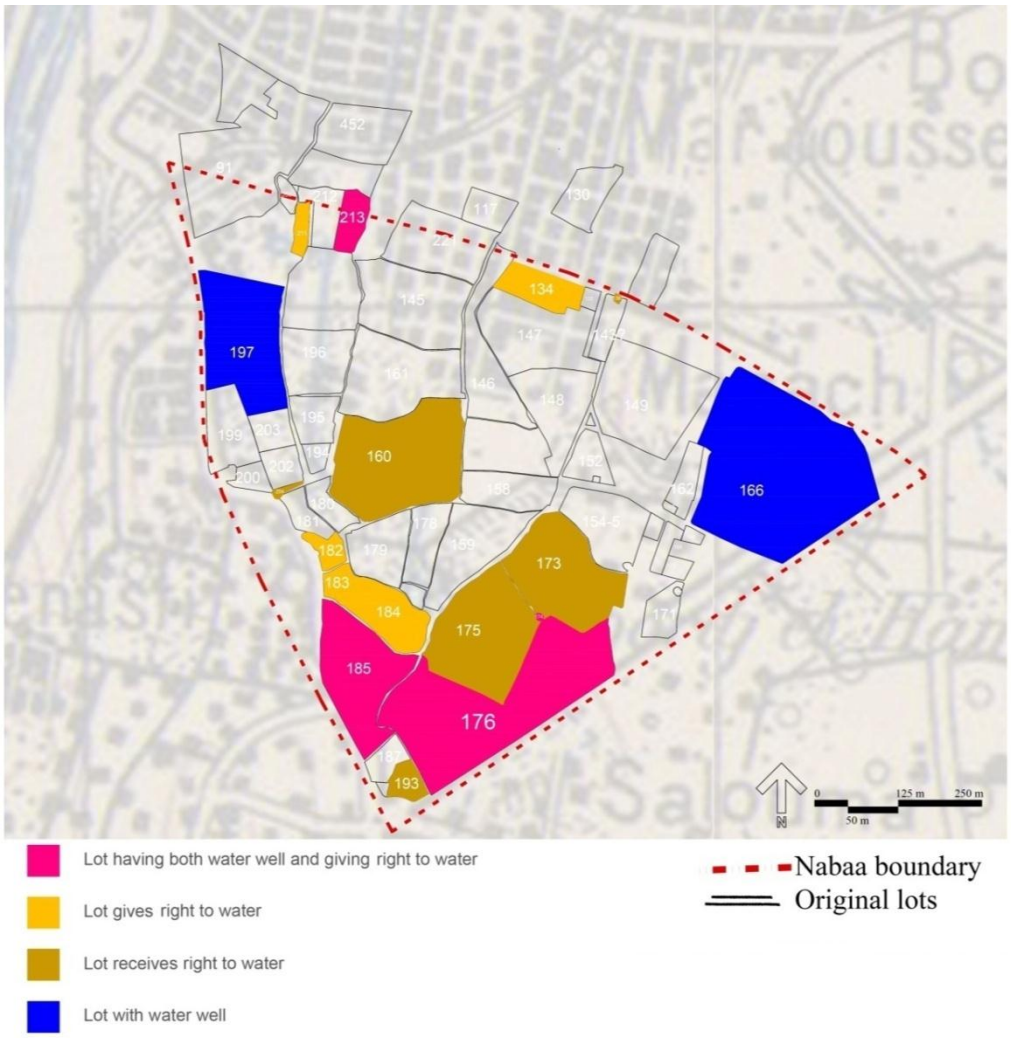


Figure 29: Water sources in Nabaa (1926)
The diagram was produced based on information retrieved from 34 lots studied by Tania El Alam's in her thesis

Figure 30: Water tower (حاووز)

Looking at the green space in the neighborhood and its peripheries over the last decades, we notice that Nabaa witnessed a rapid decrease in its agricultural green spaces compared to neighboring Dekwaneh, Baouchrieh and Sin el Fil (Lteif, 2010). The increase in urban areas was to the detriment of agricultural land (Figure 31 & Figure 32).The decrease of agricultural land slowed down in the 1970's and 1980's due to war and the slowing of economy and development (Figure 33).

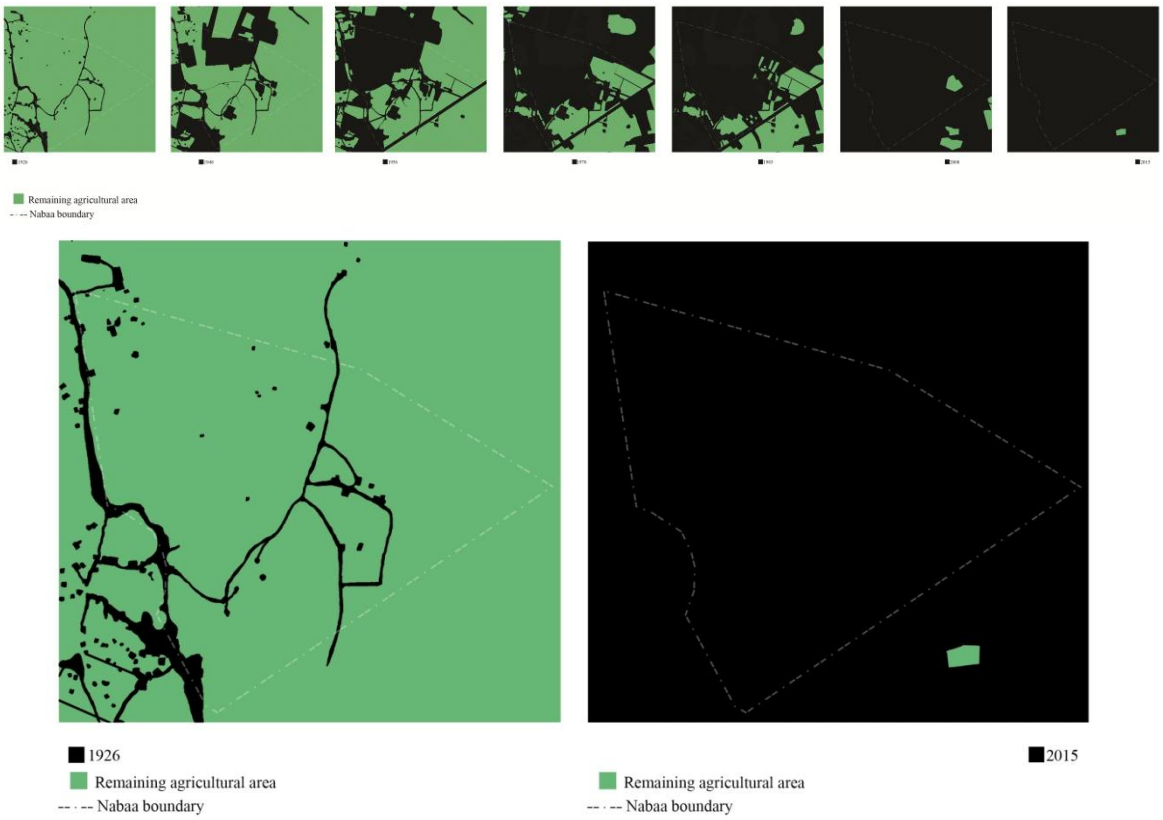


Figure 31: Agriculture in Nabaa and its peripheries over the years.
The diagrams were produced by tracing over aerial photographs and historical army maps provided by Dr. Mona Fawaz

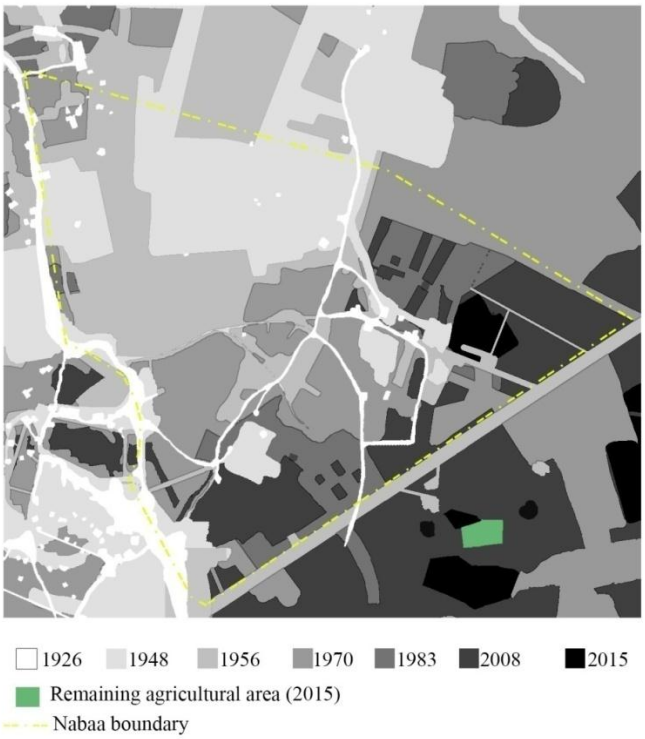


Figure 32: Diagram showing the disappearance of agricultural land over time in Nabaa and its surrounding.

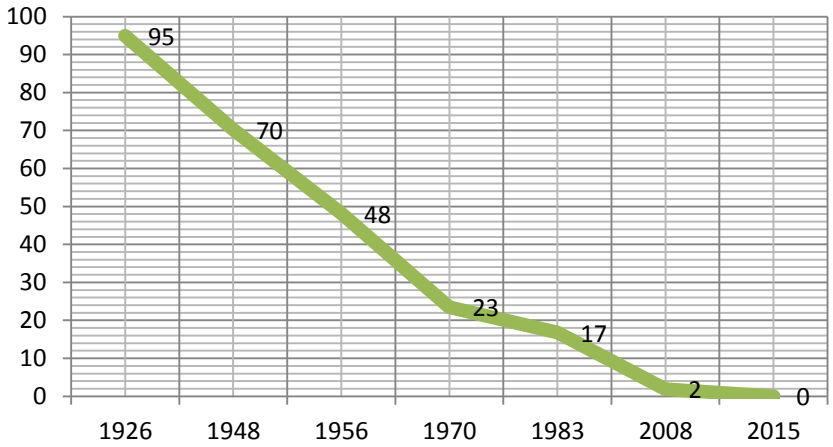


Figure 33: Graph showing the percentage of agricultural area in Nabaa and its vicinity.

The agricultural landscape in Bourj Hammoud has been in constant change. In the 1920's, agriculture consisted of cultivating mulberry trees aimed for silk production. Dwindling in the silk market in the 1930's caused the replacement of mulberry trees by "citrus trees, market gardens and in some places by sugar canes and floriculture" (Lteif, 2010, p.48). In the 1950's, orange and citrus became the dominant production. Products were sold in the wholesale food market behind cinema Rivoli in Beirut at the Northern end of Martyr's square, in local markets (Donouzlouk, Sin el Fil, and "Sandjak camp") and through push cart vendors (Lteif, 2010). A decade after, with increasing population and building densities, farmers replaced citrus trees by vegetables for economic reasons. In the 1990's, the last remaining lots located on Nabaa's periphery were mixed between horticultural and olive production (Figure 32).

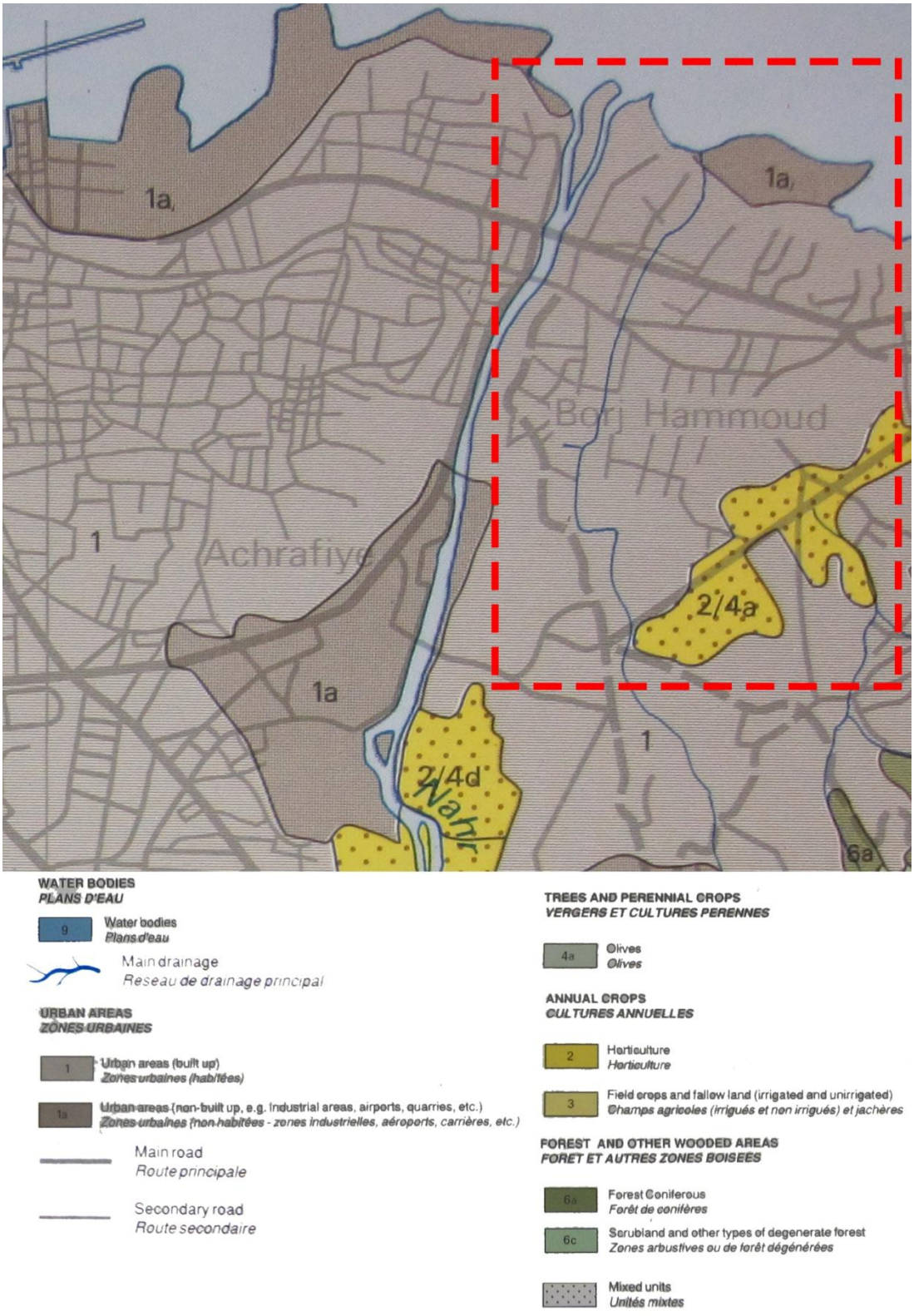


Figure 34: Vegetation cover (Source: FAO, 1990. Retrieved from AUB Jafet Library)

It is also important to note that agriculture in Bourj Hammoud was not restricted to crop production. The area was known for its animal farms. People raised animals (Figure 35), and Bourj Hammoud was considered to be among the first suppliers of dairy products to Beirut, a practice that became reduced in the 1970's.

Figure 35: Agriculture in Bourj Hammoud in the 1930's. Source: Gamar Markarian

Today no more agricultural lands are present in Nabaa. Remaining lots dedicated for agricultural production are located outside the vicinity of the neighborhood. Other nearby underdeveloped lands are sometimes used for grazing (Figure 36).

Figure 36: Grazing and spontaneous vegetation at the peripheries of Nabaa (Dekwaneh). Image taken by Mahmoud Bou Kanaan, 2012

B. Social analysis: Community, social practices and livelihood:

1. Community groups

Nabaa developed into a neighborhood in continuous flux. From marshland, It has grown to host a melting pot of communities with poverty as a common denominator: Old and new residents, dwellers, refugees, displaced and foreign migrant workers (especially from Syria, Egypt, Iraq, Asia and Africa), with diverse ethnic and religious backgrounds, being constantly exposed to the instability of the country.

The presence of ethnic, political and religious signs on the street such as flags, posters and stencils (Figure 37) have determined virtual "territorial demarcations" creating virtual borders. A "24 April" stencil on the walls referring to the memorial date of the Armenian genocide reveal the identity of this section of the neighborhood. In other places, different signs of affiliation or support to other communities or political groups can be observed (Figure 38 and Figure 39).

Figure 37: Religious diversity revealed through stencils on walls

Figure 38: Signs associated with Armenian groups

Figure 39: Signs associated with Kurdish groups

2. Hostility and fear of the other

Being foreign requires to adapt in order to survive. Narratives from neighborhood retrieved through interviews and informal talks with the neighborhood residents revealed hostile attitudes by Lebanese residents and shop owners towards Syrians. Lebanese consider that Syrian influx is pushing them outside the neighborhood and blame the refuges for making the neighborhood denser and more deteriorating. Imposed new social norms or "laws", casual harassments and constant discrimination makes it sometimes harder to the less fortunate to find their own comfort zone. With the rise in the numbers of Syrian refugees, Bourj Hammoud among other municipalities across greater Beirut, are conceiving this as a threat to security and safety and are therefore imposing curfew hours for Syrian residents (Figure 40).

Figure 40: Curfew for Syrian workers in Bourj Hammoud-Source: Facebook page: Armenians of Lebanon

Neighborhood residents live in constant fear of "the other", the other being a public authority (police) or different community groups (ethnic or religious). The different communities live together and try to avoid conflicts, however at the end of the

day they share the same services and open spaces. Shared spaces such as the playgrounds, host a diversity of users that come for a common cause: leisure.

3. Philanthropy and initiatives in the neighborhood

The field observations and filed survey have showed that there are many NGOs and organizations active in the neighborhood to support the residents. Showcases of solidarity can be spotted in Nabaa. A large number of international organizations such as Worldvision, UNHCR, Caritas, and local NGOs such as "the Social Movement" (الحركة الاجتماعية), "Beyond association", "Ayadina" and "Dar el Amal" intervene in the area to alleviate poverty and to upgrade the neighborhood (Figure 41). Most of them work with community groups in an attempt to create common shared practices and generate spaces that induce positive social interaction. Many initiatives such as wall painting, sidewalk upgrading, planting activities, creation of playgrounds and upgrading small public open spaces such as the one near the water tower (Figure 30) hoped to enhance the experience of the place, reclaiming for the less fortunate their right to the city.

Figure 41: Refugee aid by UNHCR, "Sabil" potable water dispenser, and wall painting near the playground

When asked about their opinion in those small initiatives, dwellers appreciated the work that has been done by but most of them do not feel it is useful. They perceive the municipality as the major stakeholder that is responsible for improving the conditions of the neighborhood, even though they are aware of its unaccountability.

Summary map:

In order to understand the dynamics of the neighborhood, the vibrant section extending 300 m around Farhat Mosque was chosen to identify and map the available permanent and temporary services as well as the coexisting communities. It pinpoints the location of religious and educational institutions, posters related to opposing political groups, blocked streets, signs related to an affiliation to a specific community group, philanthropic signs and other services such as push cart vending and the informal garbage collection network. The result is summarized in Figure 43, the legend is below.

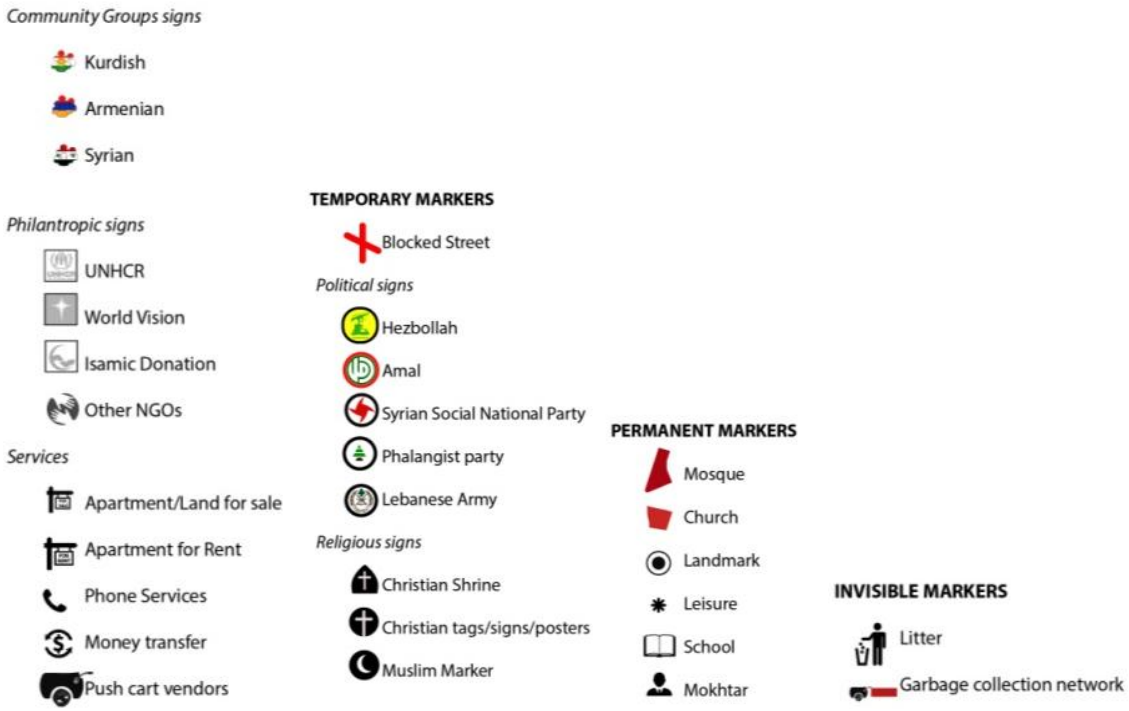


Figure 42: Legend for the Social diversity, temporary and permanent services in Nabaa

NABAA NEIGHBORHOOD/ BOURJ HAMMOUD

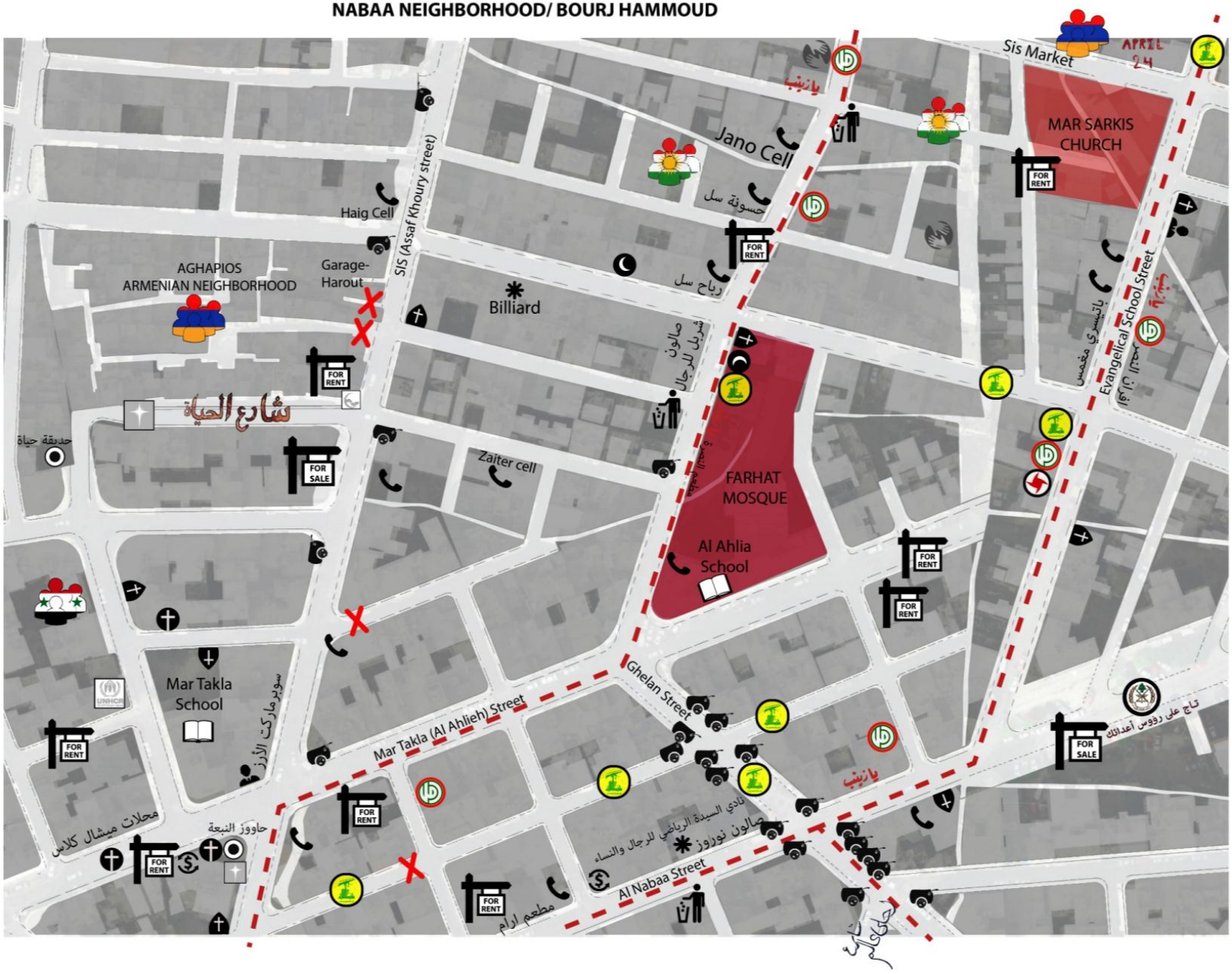


Figure 43: Social diversity, temporary and permanent services in Nabaa

4. Stories from the neighborhood:

During fieldwork, many residents approached to ask me with enthusiasm if I am from the United Nations coming to distribute donations to the residents, or to ask with fear if I am acting on behalf of the Municipality coming to request their legal residence papers, or sue them because their shop is extending illegally on the sidewalk.

Samir is a young Lebanese resident in Nabaa. He is in his early 30's, holding a university degree but hasn't found any work yet. He has a small informal shop next to his home along Sis Street where he has been selling sandwiches since his graduation, in front of lot number 1157, a lot that is currently for sale and was previously a school. When the weather permits, he places chairs on the road near the sidewalk with chicha and a T.V making this space an informal street café. He informed me that he has been planting pomegranate on his balcony and told me: "please let me know if you do any intervention or planting activity. I would be the first one to help, I always wanted to arrange a nice space for me inside the abandoned lot next to my shop but it never worked".

Figure 44: The space as “practiced”: Informal public space created by Samir, a Lebanese neighborhood resident

Many other dwellers also showed interest in reviving dead spaces and integrating food production in them. Many pointed out that the proposed intervention would improve the neighborhood. Most of the people approached consider planting on land as the easiest and most feasible idea. Among the concerns raised for an agricultural intervention on different surface areas was the legality and consent of the municipality, as well as technical issues such as the poor capacity of residential roofs to hold plants and provision of agricultural material (tools, seeds, soil, water).

C. Physical urban analysis: The neighborhood in layers

Nabaa’s history had implications on the area’s porosity, infrastructure, density and interactions. The different layers of analysis can be summarized in the following diagrams overlaying the different physical components of the neighborhood, hence formulating a general perception of the study area. These layers create at the same time a dense and complex, yet homogenous urban fabric.

1. Morphology:

The Nolli map (Figure 45) reveals the high density and the small scale of property in the neighborhood. Most open spaces are located on the neighborhood’s peripheries and act as buffer zones. In the “inner Nabaa”, the oldest inhabitated areas, congestion is at its maximum, lots are smaller, buildings are denser and streets are narrower (Figure 47). Blocks highlight the isolation of the neighborhood by infrastructural breaks and reveal the poor connectivity of the neighborhood to its

surrounding, disconnecting Nabaa's urban fabric. The block sizes become larger and roads become wider as we get closer to the edge along Sin el Fil and Dekwaneh (Figure 46). These lots which are often underused could be potential spaces for an intervention.

Figure 45: Nolli map

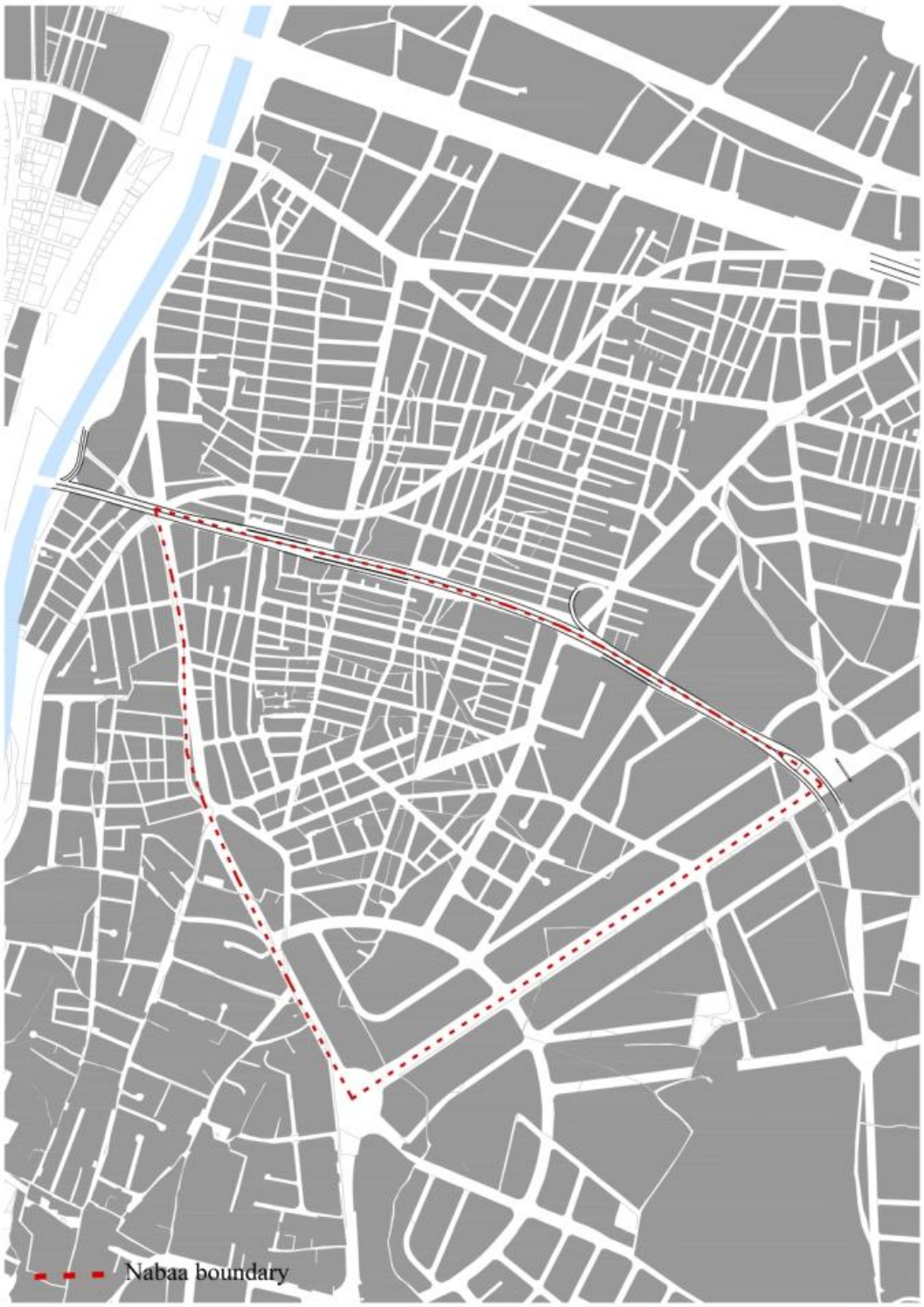


Figure 46: Blocks

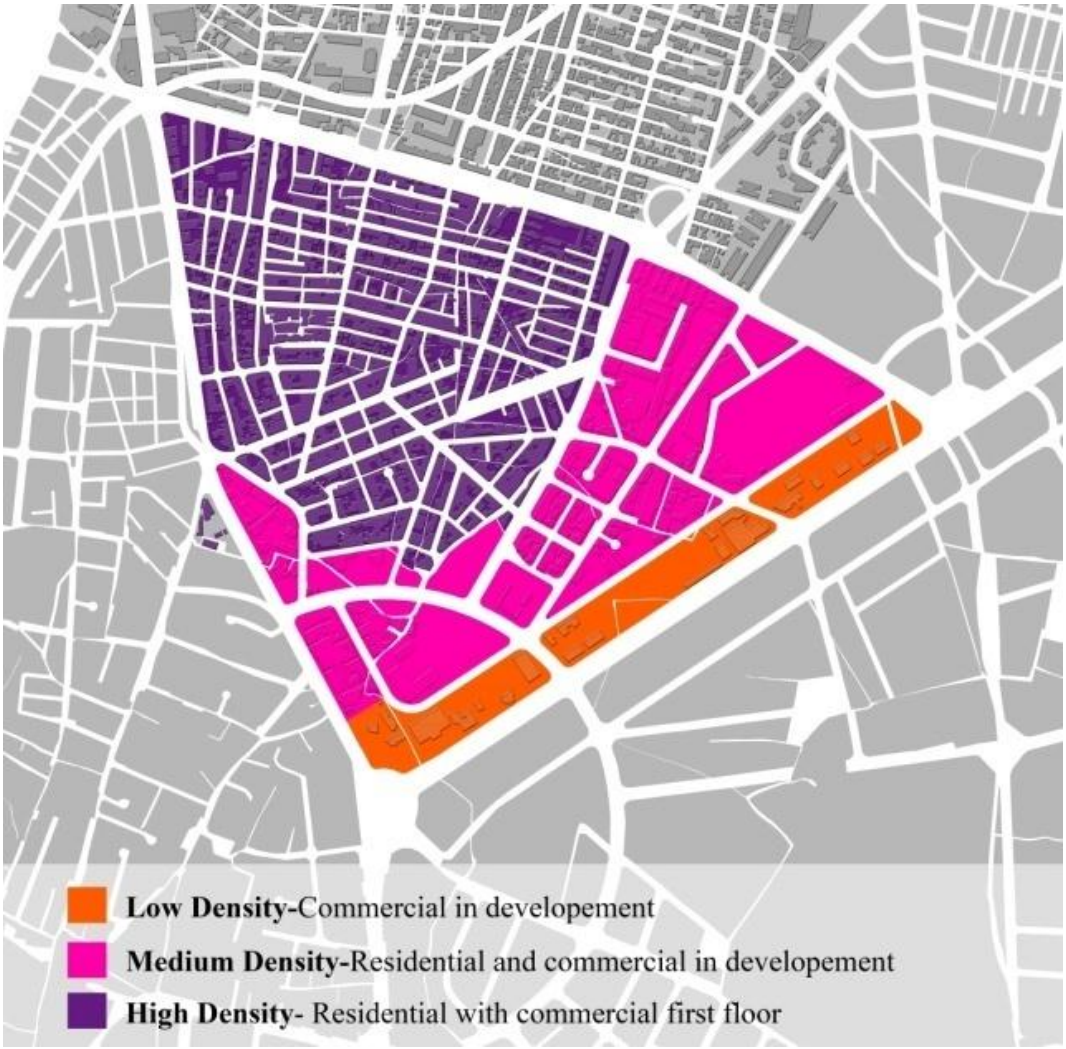


Figure 47: Density/ cluster

2. Services:

The result of mapping the services reveals that Nabaa hosts different poor communities sharing basic services that are often scarce or unavailable. The neighborhood is abundant in educational and religious institutions and NGO's (Figure 48). In the absence of provision of services by public official authorities, the reliance of the neighborhood lies mainly on predominant political parties or the help of NGO's.

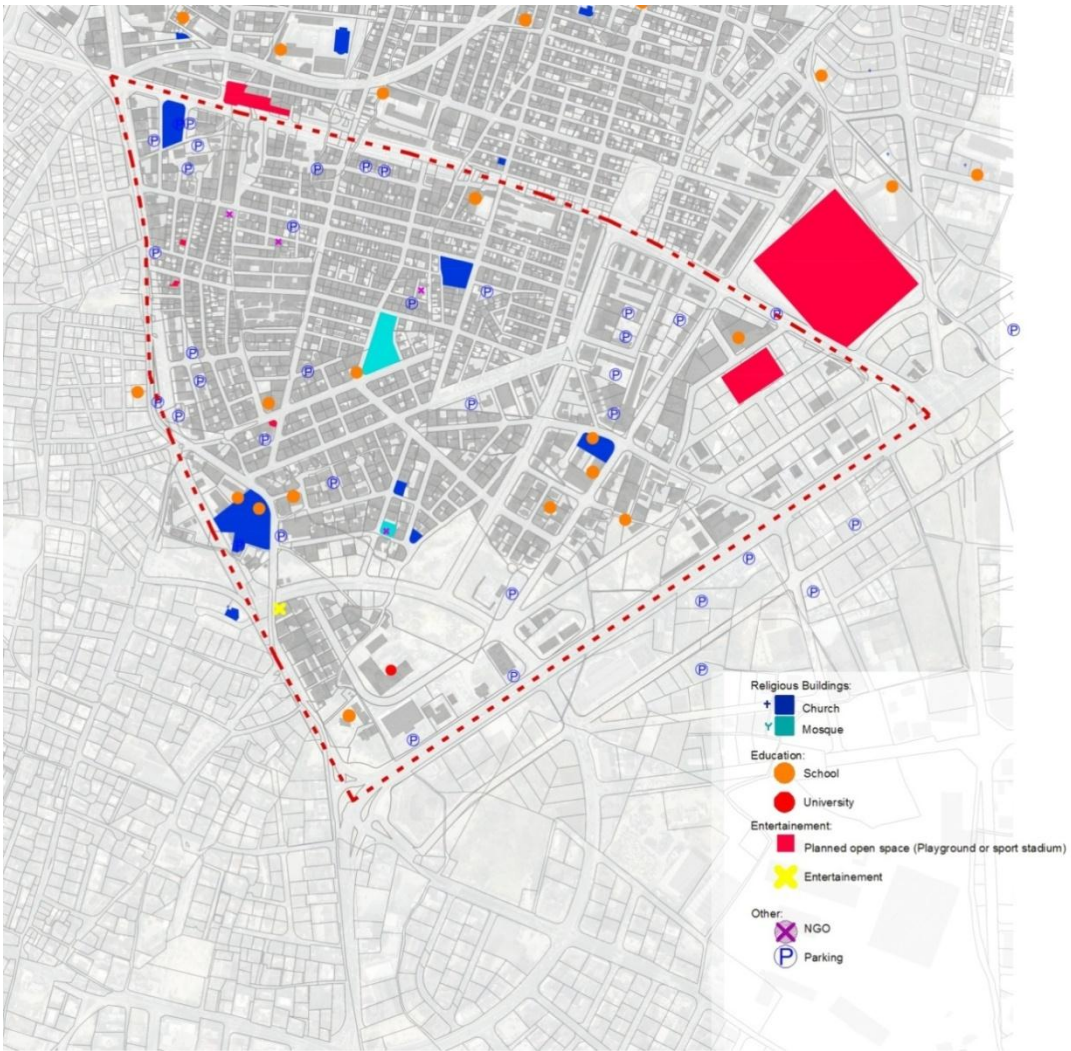


Figure 48: Services in the Nabaa neighborhood

Educational institutions: According to the CDR, Bourj Hammoud had 16 schools that hosted 2750 children in 2006. Most of the children in the neighborhood walk to nearby schools in the neighborhood and Sin el Fil. In the neighborhood study area, Nabaa has 12 schools and one university[11] . The university has recently opened its campus and was built on what was known previously as the "magic land" amusement park. The structures of the park still exist but were dumped on an adjacent lot.

Figure 49: Magic Land amusement park (2000) replaced today by a University campus (2015). Source: Google Earth

Figure 50: Structures of Magic Land amusement park

[11] AUL university (Arts, Sciences & Technology University in Lebanon)

Religious institutions: Nabaa is a very diverse religious neighborhood. It has around 6 churches, one mosque and a Husaynieh.

NGO's: There are more than 6 NGO's that were clearly identified in the neighborhood.

Leisure: Entertainment is bound to 2 playgrounds and 2 sports stadiums located inside the neighborhood and on the periphery along Yerevan flyover. As these playgrounds have a limited time schedule, the street remains the major open space for children to play and the unique public open space accessible at any time in this dense neighborhood, transforming transportation nodes into hubs of social practice.

Figure 51: Children playing in the neighborhood's street

Parking spaces: People usually park along the road or informally in underdeveloped land scattered around the neighborhood. Necessary activities such as shopping and work are usually are within a walking distance in the neighborhood.

3. Landmarks:

When asked about major landmarks or reference locations in the neighborhood, the Armenian Relief Cross and Dar al Amal locations were common answers. These are among the major NGOs that help providing basic necessities for the dwellers in the area. Some others designated their working places as landmarks for them. For some, Nabaa square (ساحة النبعة) is a major destination for buying cheap products and goods. For others, it is a place to avoid since it's crowded and noisy. In this case, landmarks in people's minds correspond to the community needs. It differs from the definition of Lynch who defines landmarks as external physical objects that act as reference points aiding in orientation (Lynch, 1960).

4. Housing:

Housing density reached in Bourj Hammoud an average of around two persons a room (56% of the displaced sheltered in the total eastern suburbs lived in a density over two persons a room, with 16% over four persons a room). Numbers are likely to be higher in Nabaa which represents the worse living conditions of the area (Khayat, 2002).

Physically, the neighborhood consists of dense, multi-storey apartment buildings ranging between 3-5 floors on small lots, typically of 50-100m^2. While many of these buildings counted 1-2 apartments when they were first built in the 1940s and 1950s, they are today subdivided into 2-3, one to two room apartments, each inhabited by a family. The majority of the houses does not receive sunlight and is prone to humidity. Nabaa has a large number of absentee owners, a main reason behind the development of the large rental market (Figure 52) and the current deteriorating living

conditions in the neighborhood. This market reflects transience that is integral to the identity of Nabaa and that affects its spatiality since around 80% of Nabaa dwellers are transient informal renters, always in search of cheaper rents (Samaha, 2015).

Figure 52: Rent market in Nabaa

With the high levels of migration to Nabaa, pressure increased on housing markets. Access to housing for the poor relies on different dynamics. They often rely on their family members for social and financial support to find cheap housing when they first come to the city. Informal markets become then efficient and dynamic venues of property exchange that respond adequately to low income dwellers' needs (Fawaz, 2009)[12].

5. Economic activity: The fruit and vegetable market

Nabaa has a multiplicity of shops along its streets with small scale businesses and industries (Figure 53). Shops are often rented without registering in the municipality or obtaining official permits. One can notice the absence of foreign and international brands along the streets that often function as a "local" commercial ground

[12] Planning workshop report (Dagher & Samaha)

floor, while many stores have been turned into homes particularly after the recent Syrian refugee crisis.

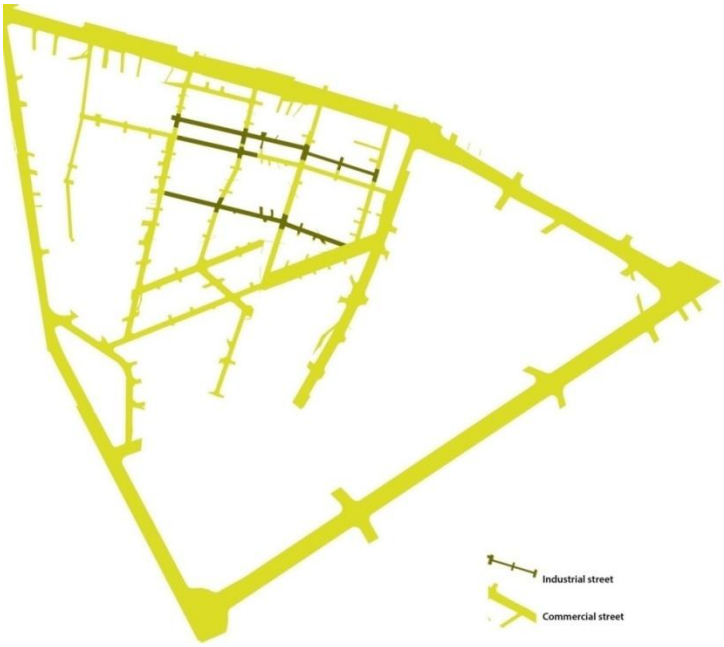


Figure 53: Nabaa street function. Source: Tania El Alam, 2014

A notable fruit and vegetable market is at the core of the neighborhood's economic activity. The fruit and vegetable vending business is considered as a survival strategy for many people in the neighborhood. Most of the vendors rely on the Sin El Fil wholesale market to get their fruits and vegetables, due to its close proximity to the neighborhood; others bring their products from Dekwaneh or from the Bekaa (Figure 54).

Figure 54: Location of fruit and vegetable sources

Four types of fruit and vegetable vending in the neighborhood are dominant. They were identified though field observations and photographic surveys and are described below.

i. Stationary vending:

- *Formal fruit and vegetable formal shops:* these shops on the ground floor of residential buildings are either dedicated to selling only fruit and vegetables or are integrated in a grocery store selling other items. These shops often extend their goods on the sidewalk. In Nabaa, a small 20 m^2 shop can be rented for 250$. Electricity costs vary around 50 000 LL and an extra100$ for subscribing to "generator service" and around a 260 000 LL water expenses that does not include extra purchased water tanks every once in a while. Many of the shops sell fruits and vegetables to their clients on credit.

Figure 55: Fruit and vegetable formal shops

- *Informal fruit and vegetable shops:* For vendors who can't afford the expensive shop rents, there is an informal alternative. They use the street and sidewalk as a shop by displaying their products stacked on the floor or on temporary and easy movable structures.

Figure 56: Fruit and vegetable informal shops

ii. Mobile vending:

- *Fruit and vegetable push cart vendors:* They are street vendors touring the neighborhood with their cart. Some of the street vendors go to Sin el Fil wholesale market walking and come back by "service" with their products. Most of the vendors own the cart while others rent it for 50 000 LL per month. In hard times, when in sickness or during harsh weather conditions, they either refrain from working or rely on the highway as a shelter. All the interviewed vendors haven't reached beyond high school and the majority is not new in the business (the range varies between 2 to 18 years in business). Even though the majority resides in the neighborhood, many vendors commute from other areas. One of them informed me that selling fruits and vegetables in Nabaa is only a summer job, during other times he sells juice on his cart in Dahieh, in the Southern suburb of Beirut. Street vendors usually tour the neighborhood and stop their cart for an average of one to one hour and a half wherever space is available, mainly on sidewalks, street corners or in unused lots. They usually avoid parking next to stores and some avoid to pass by or to sell in certain areas such as in the Souk near the mosque where they risk to be caught especially if they don't have legal papers. Many have health problems and work infrequently during the week. Otherwise, they work all days and sometimes even on Sundays. 90% of the street vendors declared that they would have preferred to work in an organized earmarked market on the periphery of the neighborhood. Old men in the business reminisced about an old organized market that existed before the flyover was built. Shopkeepers rarely consider street vendors as

competitors. Only 10 % consider them as having negative effect on their business. They do not harass them, and some of them store the vendors' goods or carts overnight in their shops.

Figure 57: Fruit and vegetable push cart vendors

- *Fruit and vegetable vans:* Some vendors tour the neighborhood in their vans equipped with fruits and vegetables at certain times of the day. They deliver products to stores or directly to consumers before leaving the neighborhood afterwards.

Figure 58: Fruit and vegetable van

In general, fruit and vegetable vendors get their products themselves from nearby markets, mainly from Sin El Fil wholesale market from 5:30 am till 8 am every day or every other day. In order to cover the rising living expenses, most vendors work late till night and have had other jobs in the past but currently are holding only this job. Many of them have planted fruits and vegetables in their hometown in the past either for selling or for home consumption. Afternoon is the busiest time of the day (3 till 6 pm) when workers are on their way home. All vendors keep their unsold products for the second day, or sell it at a cheaper price towards the end of the day and then throw unsold or perished products in the garbage (Figure 61). Some streets vendors sell a mix of different types of fruits and vegetables, others stick to one type and have their own specialty, for example one of the street vendor sells only bananas.

Most interviewees approached were low income refugees, migrant workers or local tenants. Most of them are males having non working wives that are either looking for work or taking care of the children and home chores. Most of them didn't mind if

their spouse worked, since it will “bring more money home”. Other neighborhood residents showed interest in growing their own food for home consumption with surpluses being traded.

Figure 59: Unsorted organic waste in the neighborhood

Interviewed neighborhood residents tend to consume more vegetables than fruits according to what vendors told me and from what I heard from them. All of them buy from street vendors, or nearby shops. They consider that they offer an ample range of choices that does not need to be widened. The most consumed and sold fruits and vegetables are listed below:

Fruits	**Vegetables**
Banana	Tomato
Lemon	Cabbage
Orange	Lettuce
Grape	Cucumber
Apples	Potato

While some perceive that the space under the Yerevan Bridge could serve as a great place for an earmarked market. They are skeptical about what it would bring in such as alliances of foreign workers and squatting.

Figure 58 highlights (1) the location of fruit and vegetable shops, (2) where push cart vendors stop to sell their products and (3) where they park their cart at night. Many push cart vendors aggregate in the Souk near the mosque and park their cars along the road or in abandoned lots.

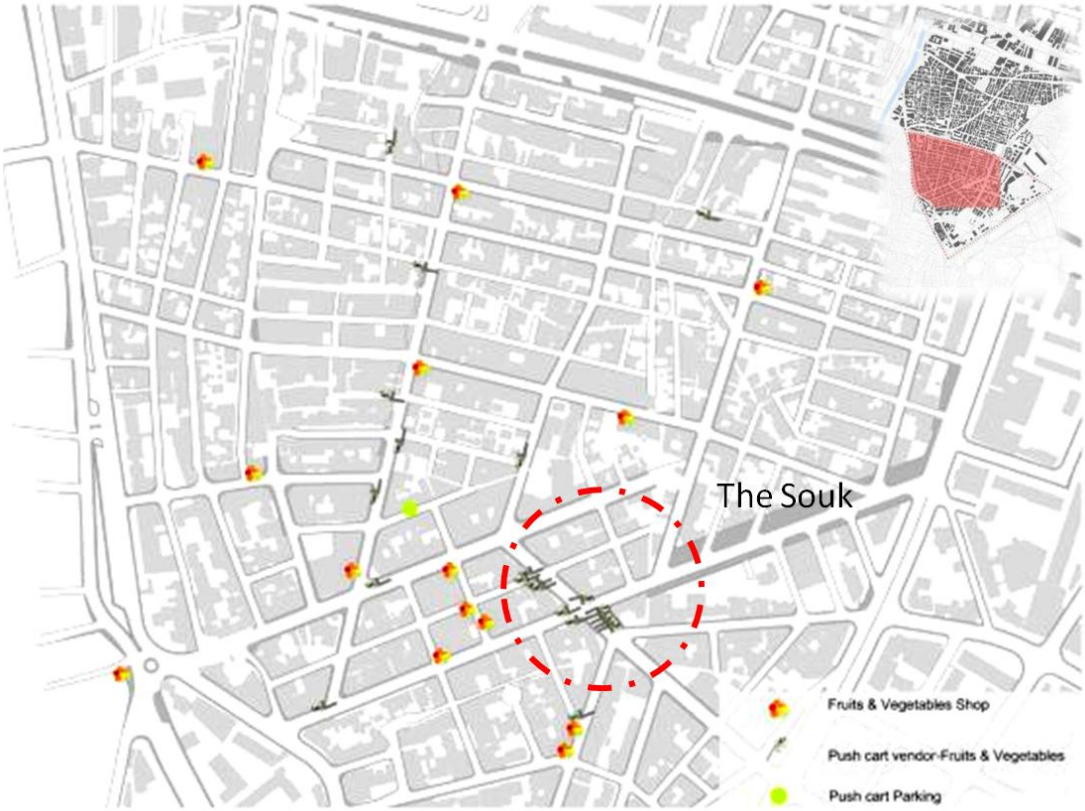


Figure 60: Fruit and vegetable vending mapped in one section of the neighborhood.

6. Environment:

At the neighborhood scale, Nabaa suffers from multiple environmental problems. The organic garbage resulting from fruit and vegetables adds to an unorganized garbage collection network. In the absence of garbage bins inside the

neighborhood, street littering is common. Building corners and vacant land are used for collecting garbage (Figure 61). They are locally managed through an informal garbage network (Figure 63) based on collecting and delivering garbage to different sites for reuse or sorting (Figure 61 and Figure 62) .

Figure 61: Locally established garbage collection in Nabaa

Figure 62: Garbage sorting

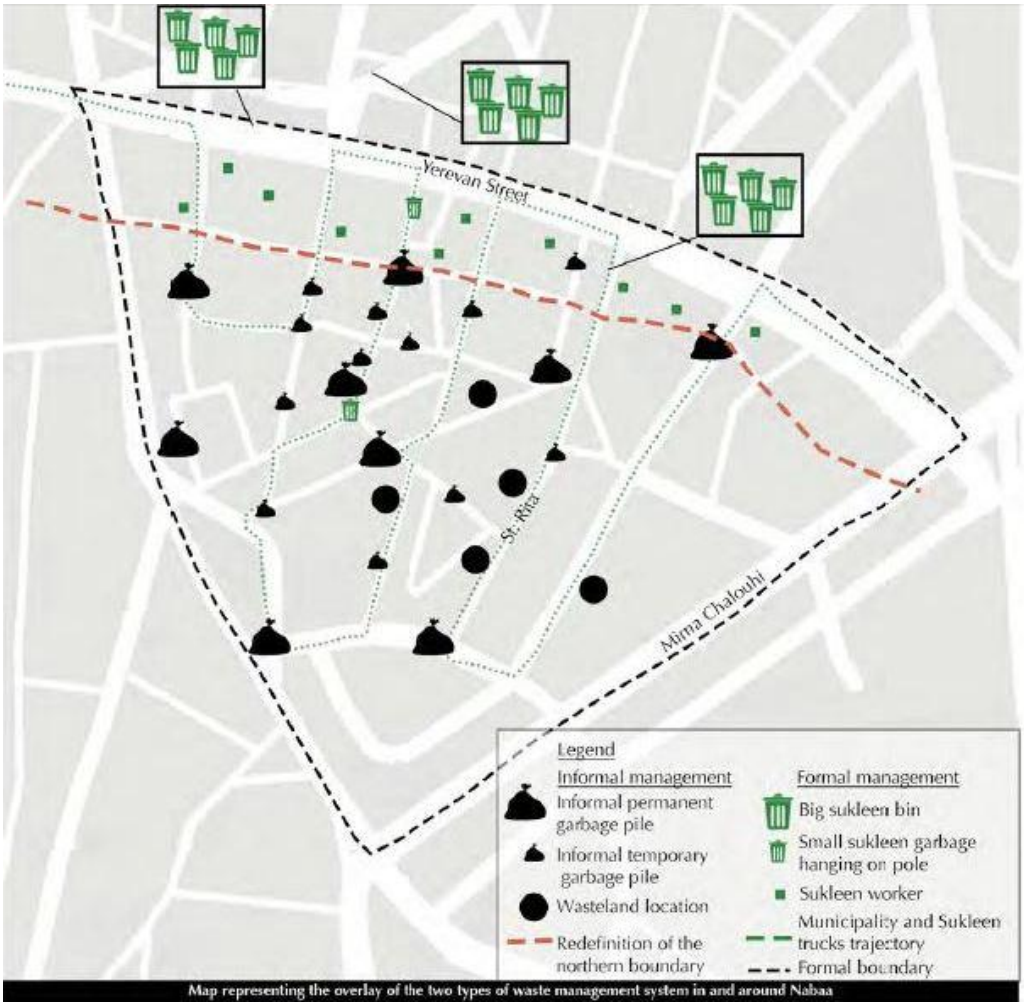


Figure 63: Map showing the coexistance of two waste management systems in Nabaa. (Source: Marilyn Antaki)

To counter this effect, some garbage collecting spaces have been replaced with religious shrines surrounded by greenery, expecting people to refrain from littering near sacred places (Figure 64). Ironically, these spaces are often used by children to play (Figure 65).

Figure 64: Greening near shrines

Figure 65: Children playing near shrines

All individuals that were approached for the questionnaire informed me that they have never sorted their garbage neither at home nor at work, which is common not only to Nabba but to Lebanon in general. Some NGOs such as Dar El Amal have been encouraging some recycling initiatives by collaborating with “Arc En Ciel”, an NGO which part of its initiatives is collecting recyclable material such as plastic and paper. Other problems include humidity, lack of sunlight in some places and various forms of pollution come to add to the unorganized garbage collection.

On a larger scale, I mention the polluted environment from the Bourj Hammoud dump site and from the polluted Beirut River running at the edges of the municipal boundaries that add to pollution from major infrastructure.

7. Natural assets:

Beirut presents the lowest ratio of accessible green space per capita among world cities estimated at 0.8 m^2/ person while 9 m^2 is the standard recommended by the World Health Organization (Frem, 2009). The case of Nabaa is even worse. It is deficient in green and open spaces, most of them located on the peripheries or on underdeveloped private land. Natural assets in the neighborhood restricted to:

(1) Discontinuous streetscape with narrow, shaded and congested sidewalks contrast with Bourj Hammoud's green main streets that are cleaner and well landscaped.

Figure 66: Streets in Nabaa

(2) Few trees remaining from previous *agricultural orchards* belong to private gardens. Mulberry, pomegranate, citrus and lemon are the most common species remaining in the neighborhood.

Figure 67: Fruit trees in the neighborhood

(3) Spontaneous vegetation in underdeveloped private land (Figure 68).

Figure 68: Vacant land on the periphery of Nabaa. Source: Mohammad Saad, 2014

8. Sustainable initiatives in Bourj Hammoud and Nabaa

a. <u>Initiatives by the municipality:</u>

In the upper Bourj Hammoud area, the municipality has integrated a greening strategy that excludes the Nabaa neighborhood. Edible fruit bearing plants such as olive and lemon trees (Figure 69) are mixed with ornamentals along the sidewalks.

Figure 69: Olive and orange trees in Bourj Hammoud's streetscape. Source: Author and Shutterstock.com

Near the municipal stadium, the municipality has its own plant nursery used for propagating plants used for landscaping. In the "saha" (ساحة) of Bourj Hammoud, a new green wall system has been recently installed to complement the existing managed landscape (Figure 70), inspired from a system installed in the streetscapes of Yerevan in Armenia. It has been installed near an open air café; also inspired by the open air café culture in Armenia (Figure 71). This highlights the importance of culture and how these small interventions help in creating a sense of belonging.

Figure 70: Landscape in Yerevan Armenia vs. Bourj Hammoud.
(Source: www.yerevan.am and author)

Figure 71: Bourj Hammoud municipality square.
(Source: www.ugo.cn and Outdoor Cafe Culture armenia-ousideinsider.wordpress.com)

In addition to the greening, the municipality has other interests in sustainable practices. It has established good connections with NGO's working in the neighborhood as well as collaborations with foreign municipalities such as Hospitalet de Llobregat located in Spain for strategic and sustainable initiatives in Bourj Hammoud (Source: Bourj Hammoud Municipality). Among the recent big projects that were executed is the Beirut river solar snake project (BRSS). It is a pilot project that is part of the government's National Energy Efficiency Action Plan (NEEAP). The project consists of photovoltaic panels (PV) for renewable energy suspended across 30 meters on top of the Beirut River (Figure 72) supporting Electricité du Liban (EDL) with 10 MW of energy.

Figure 72: Beirut River Solar Snake (Source: www.brsslebanon.com)

The municipality is also encouraging recycling initiatives by introducing Sukleen's "Red and Blue" campaign in main institutions. However, there are not even recycling bins on the streets in Nabaa.

Figure 7: Initiative by the municipality promoting recycling in collaboration with Sukleen

Other initiatives and activities include organizing a farmer's market in collaboration with Souk el Tayeb and a tradition of distributing plants to the residents each spring of every year on mother's day.

Figure 73: Every Spring on Mother's day, the Municipality of Bourj Hammoud distributes plants to the residents. Source: Bourj Hammoud Municipality

b. Individual initiatives by the community:

Many residents have compensated the lack of green spaces by introducing customized local typologies of green practices. Plants are grown even in the smallest places by the residents. They use different surfaces and locations for planting such as roofs, balconies, wall, at the home entrance, along the streets and near shrines. While most plants grown are ornamental, few residents grow edible plants (Figure 76). A common practice is extending grape vines from the sidewalk to the balcony. Sometimes very small spaces are used to stack pots on top of each other or hanging them on the wall. Planting in pots is a very common practice as highlighted by the red dots on the map (Figure 79). Upcycled containers are often repurposed for planting (Figure 80).

Figure 74: Nabaa's green balconies

Figure 75: Home entrances

Figure 76: Kitchen garden grown in pots at the home entrance

Figure 77: Nabaa's green roofs. Many residents grow on their roofs grape vines or other ornamental trees

Figure 78: One of the residents garden inside the neighborhood

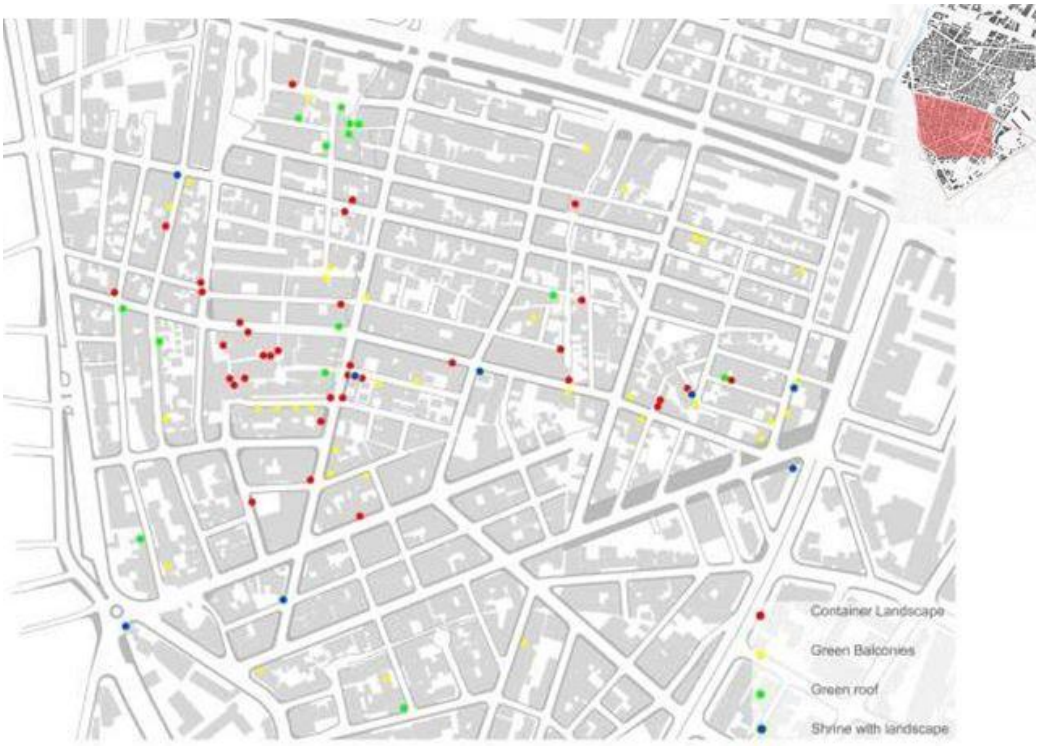


Figure 79: Green practices

Figure 80: Residents using upcycled material in their greening practices

Some international NGO's such as the World Vision initiated greening campaigns in the neighborhood by planting trees on sidewalks. However, the new

planted trees affect mobility since they have been planted in the middle of narrow sidewalks (Figure 81). Worldvision also helped some residents in setting up structures on their roofs to climb grape vines.

Figure 81: A narrow sidewalk before and after planting ornamental Ficus trees.

Other practices include energy generated by wind turbines as an alternative for generators (Figure 82)

Figure 82: Wind turbine in Nabaa

9. Open spaces and their access:

The scarce availability of open public spaces in Nabaa provides limited venues and a barrier for social interaction beyond the street that can be divided into:

(1) *Landscapes of inclusion:* At the time where security measures control open spaces, justified by claims about the public being associated with uncivilized behaviors, the playground in Bourj Hammoud managed by the municipality have a schedule and is policed. Established in 2009, this playground is always crowded with kids and their parents from various backgrounds, ethnic and religious groups who come due to the scarcity of public spaces where the children can safely play.

(2) *Landscapes of exclusion:* The mechanisms of producing segregation have become more obvious and more complex (Caldeira, 1999). Visual territorial demarcations are fortified by physical barriers that restrict accessibility to some areas. Gates and bollards along the streets are common sights in Nabaa. They have formed an esthetic form of security that is aimed to restrict or reduce the access of others to certain sections in the neighborhood, shaping the character of public life and interactions. For example, the Aghapios Armenian neighborhood has its own gates segregating its Armenian residents from its surrounding.

Figure 83: Gates and barriers

As violence, insecurity and fear increase, the municipality is adopting different strategies such as intensive landscaping and fencing on public municipal open spaces in order to restrict access (Figure 84). The street remains as the unique public open space accessible at any time in this dense neighborhood, transforming transportation nodes into hubs of social practice.

Figure 84: Intensive landscaping on municipal land

Few other places managed by locals have seen a counter effect where fences have been removed (Figure 85).

Figure 85: A fence removed around a landscaped area. Pictures taken respectively in February and April 2015.

At the time when the new shopping malls and social venues cater for those who can afford it, giving them more choices and opportunities, residents of the neighborhood find leisure elsewhere. For recreation, some dwellers do not use public spaces; they just visit friends and family. Others go to Bourj Hammoud's playground along Yerevan

flyover, or to the Horsh Tabet public garden, or the corniche. Churches (Saydet al Naher, Mar Youssef) were also mentioned as places frequently visited.

D. Mapping and analyzing open spaces

In order to identify suitable open spaces on land for an urban agriculture intervention, unbuilt lots within the study are and its surroundings (Sin el Fil, Bouchrieh and Dekwaneh) were mapped and analyzed following the methods explained previously in chapter III. These lots have more potential than leftover spaces within built lots (Figure 86) and will contribute to the main nodes in the proposed urban agriculture network in the next chapter. Variables studied for selecting land surfaces suitable for the intervention are represented in the following diagrams.

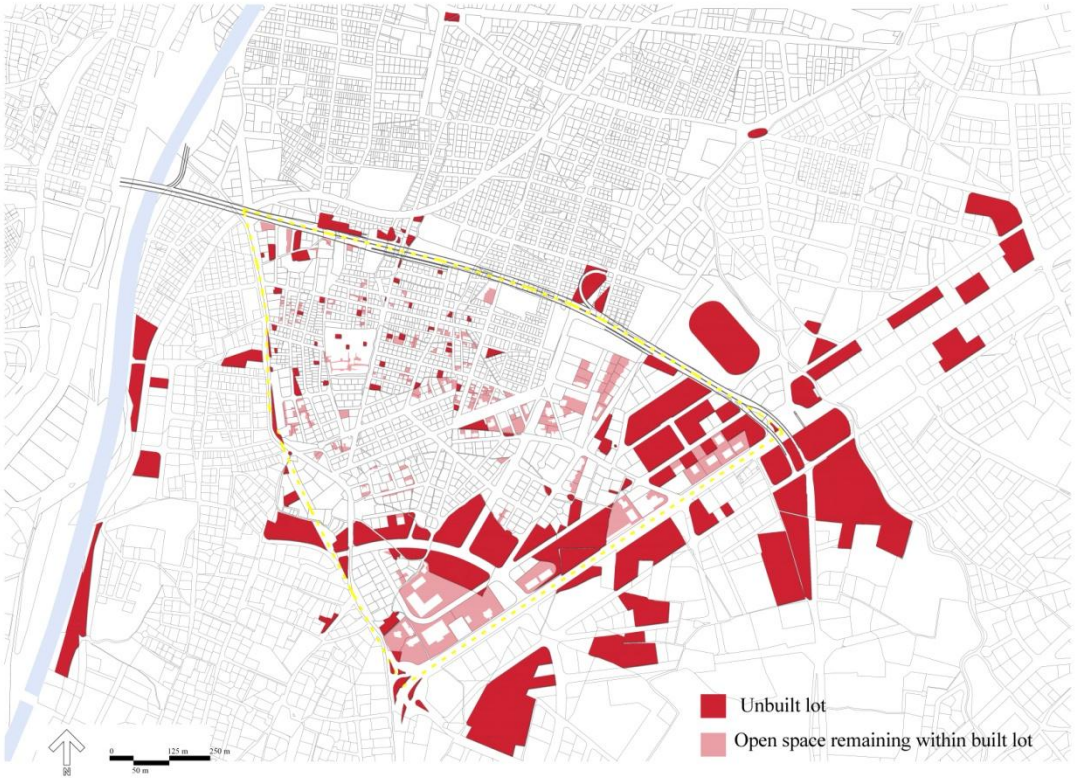


Figure 86: Map of unbuilt lots and open spaces remaining within built lots

1. Unbuilt lots

Figure 87: Unbuilt lots

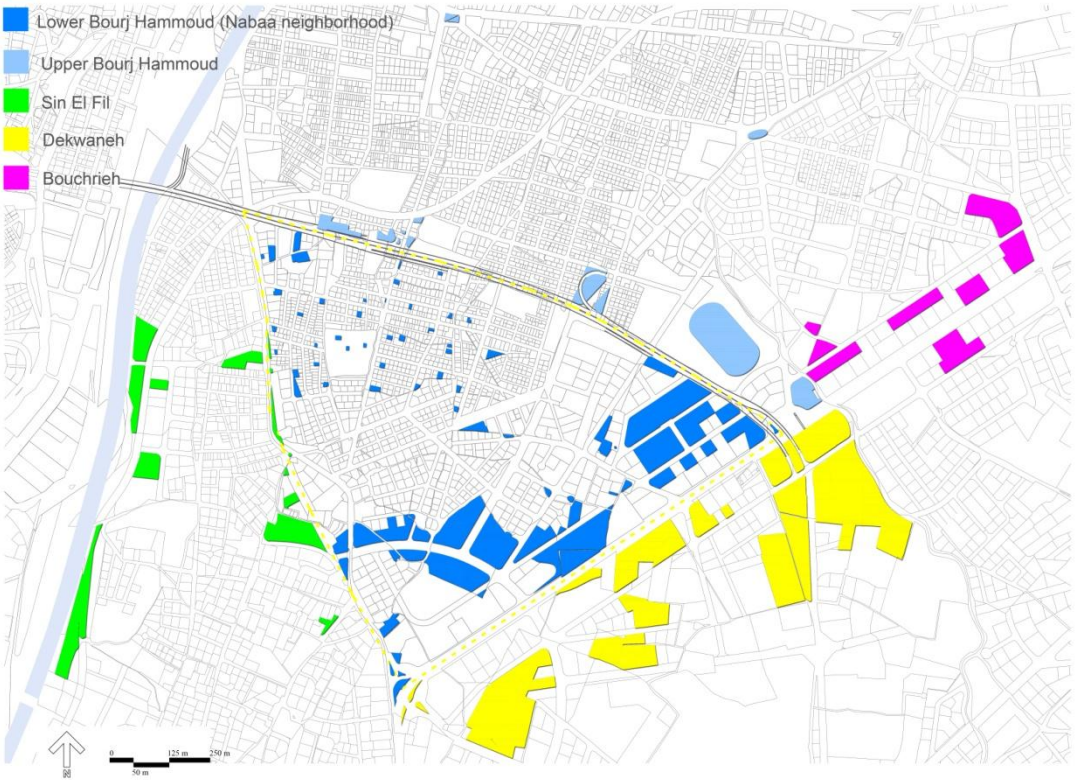
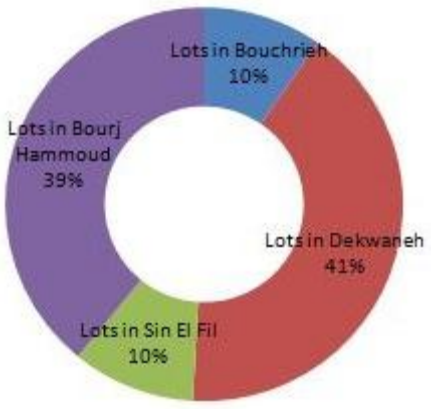


Figure 88: Unbuilt lot location according to municipality

Figure 89: Unbuilt lots location with regards to Nabaa neighborhood (inside the neighborhood, outside the neighborhood and on the peripheries)

All unbuilt lots studied sum up to 0.25 Km^2 which is equal to half of the area of the neighborhood. Unbuilt lots that are within the jurisdiction of Bourj Hammoud constitute 39% of the total area studied.



Location	**Area (m^2)**	**Percentage of total area**
Lots in Bouchrieh	2 4653.7	9.7
Lots in Dekwaneh	10 4520.9	41.2
Lots in Sin El Fil	25 519.2	10.1
Lots in Bourj Hammoud	98 941.8	39.0
TOTAL	253 635.6	100.0

2. *Function*

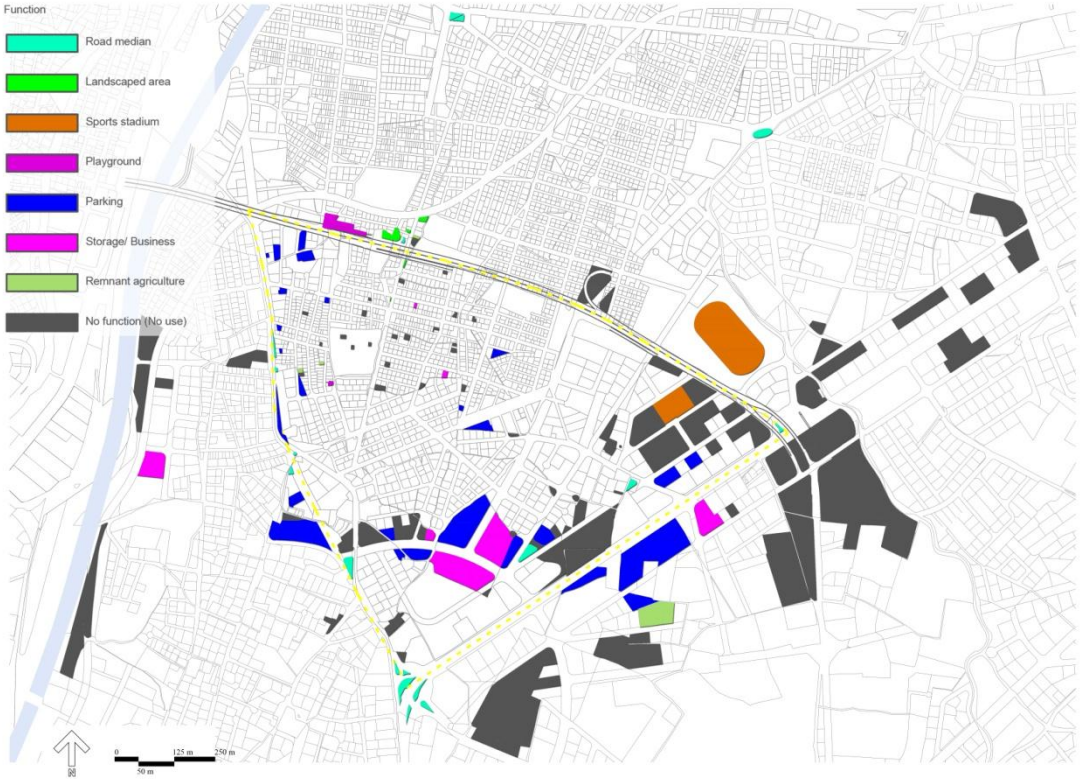
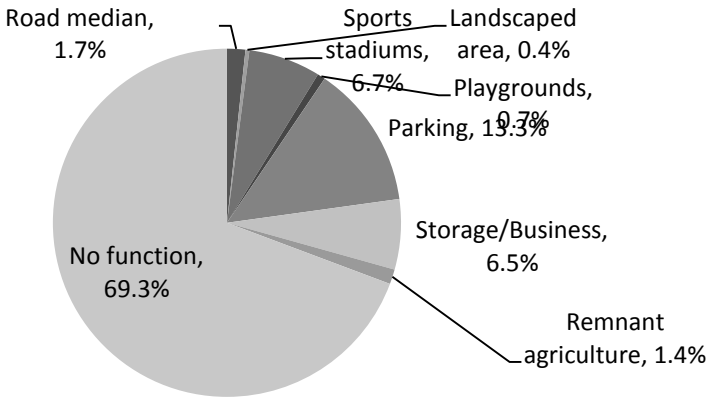


Figure 90: Function



Around 70% of the lots have no designated function.

3. Extent of use

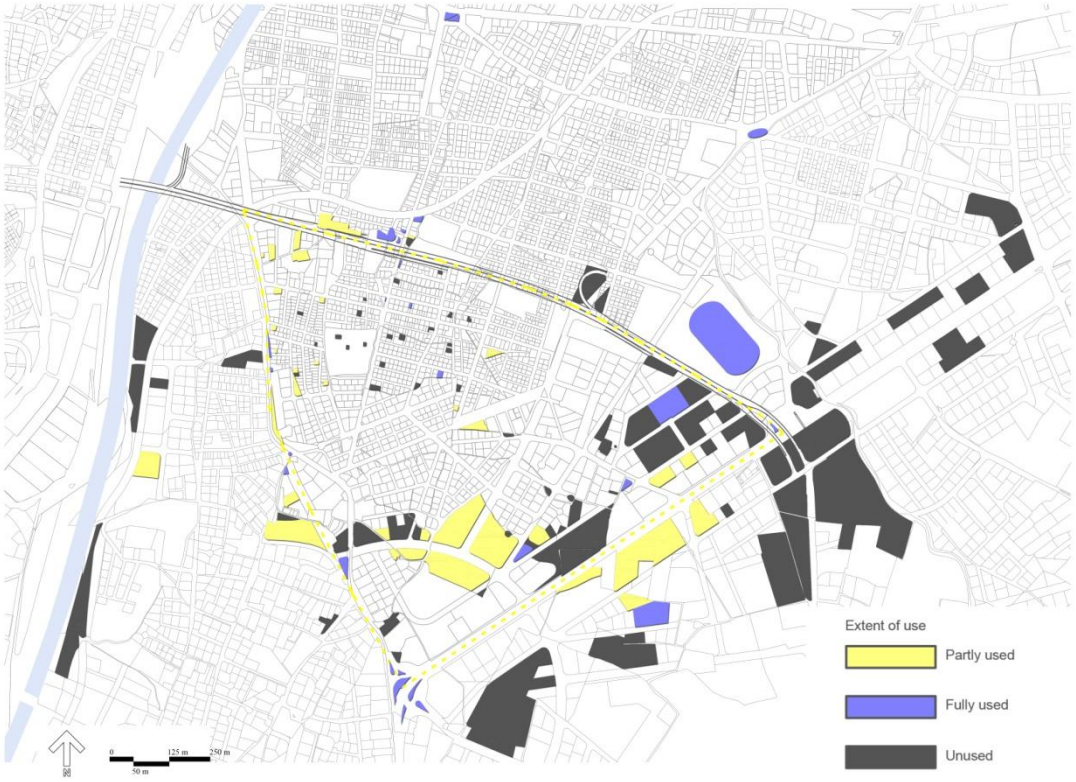
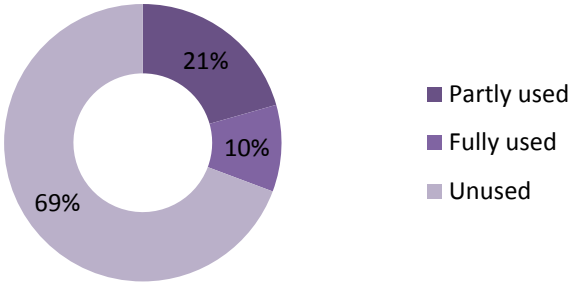


Figure 91: Extent of use



Among the lots that have a designated function; most of them are partly used.

4. Soil availability

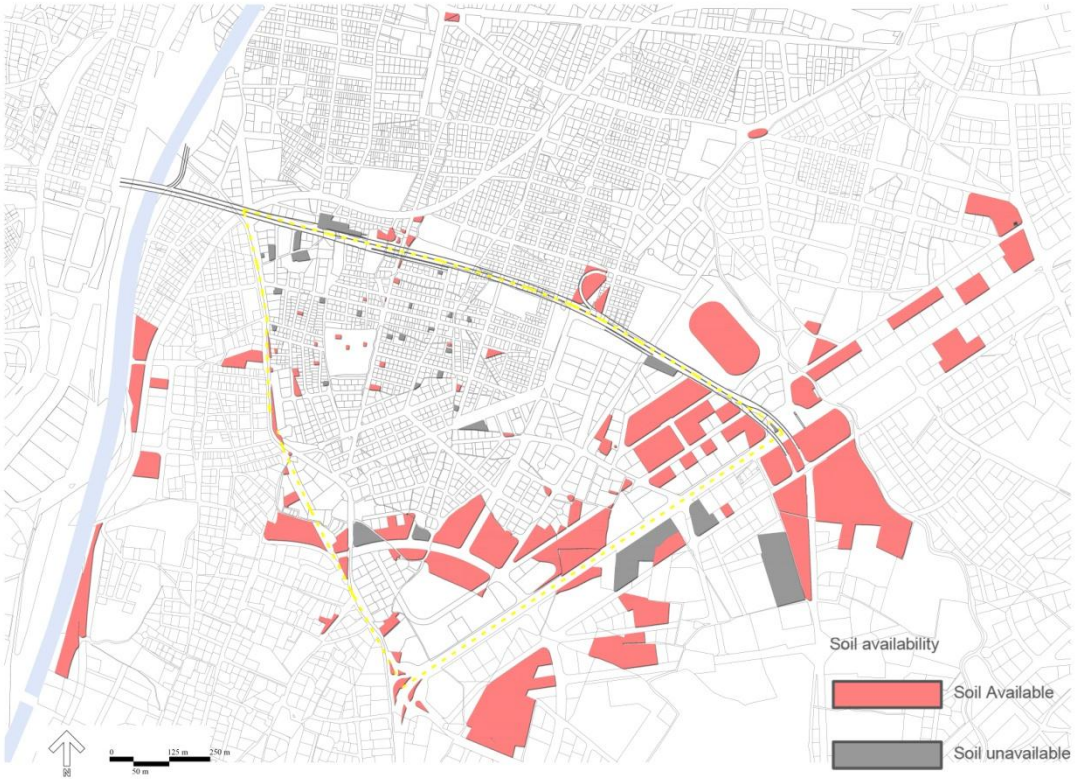
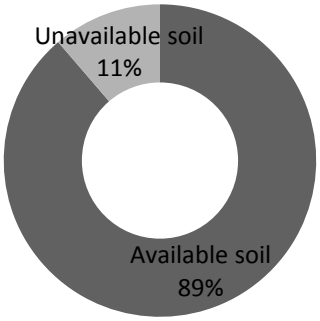


Figure 92: Soil availability



The soil availability analysis revealed that most of the studied lots have soil. However it does not inform about soil composition, quality and suitability for planting. In most cases, based on observation, soil is of poor quality.

5. Green cover

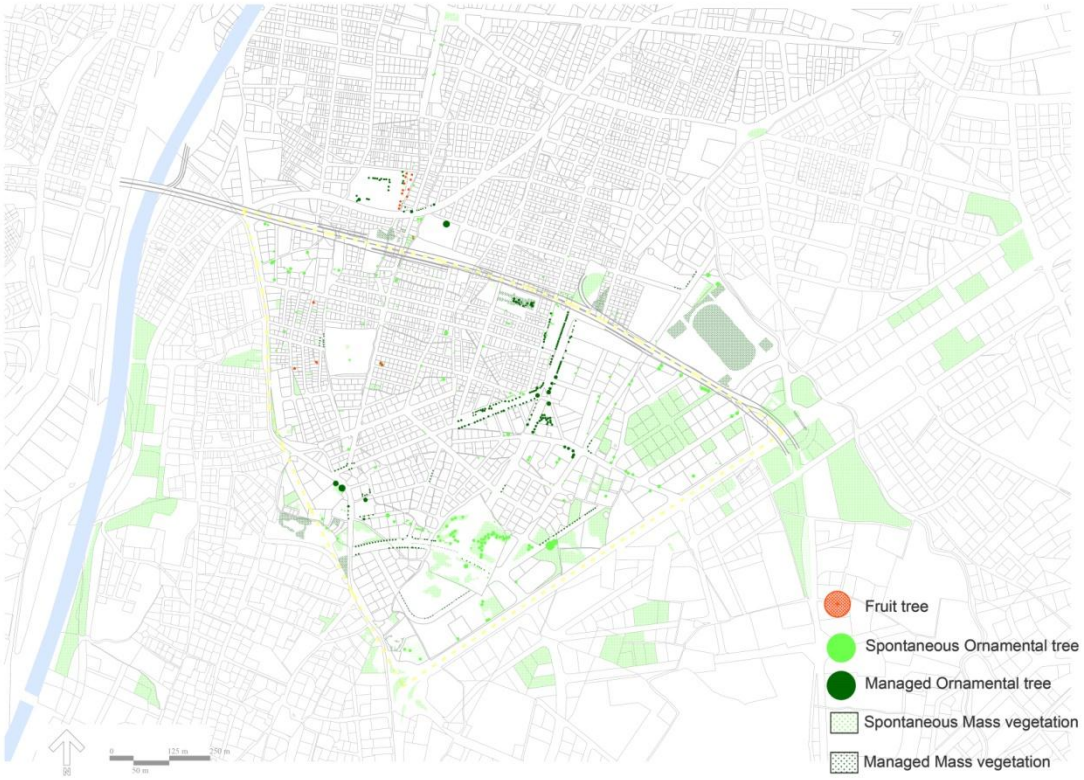


Figure 93: Green cover

As stated earlier, Nabaa is deficient in green open spaces. Most of the green spaces are spontaneous vegetation occurring on underdeveloped land.

6. Ownership

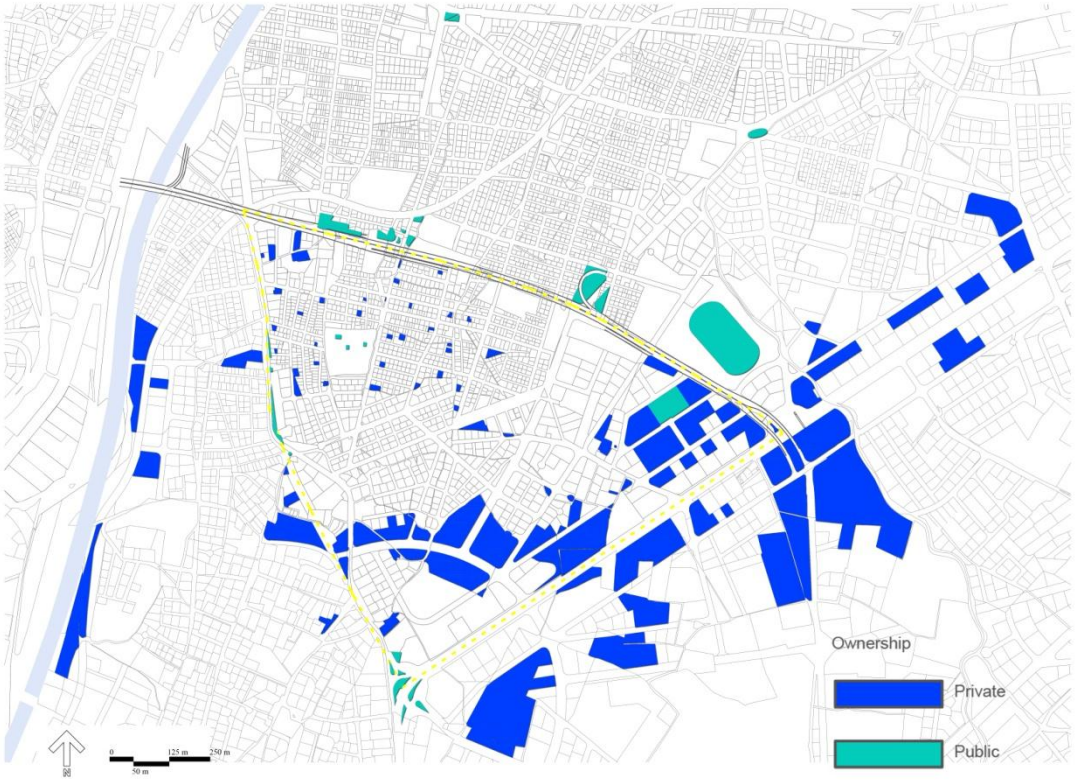
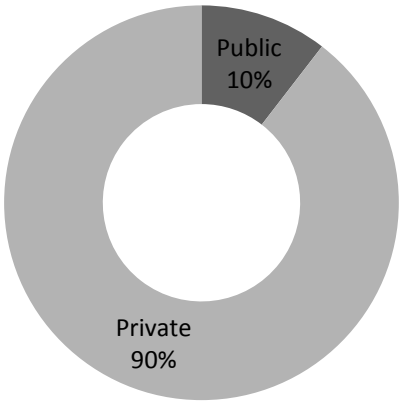


Figure 94: Ownership



The scarcity of publicly owned spaces in the neighborhood is evident. Only 227 104 m^2 are public lots. The rest is private property (227 105 m^2). Most of public lots owned by the municipality are located on the edge of Nabaa along the Yerevan highway. Some lands are still underdeveloped (Figure 95).

Figure 95: Underdeveloped municipal land

7. Prospective projects

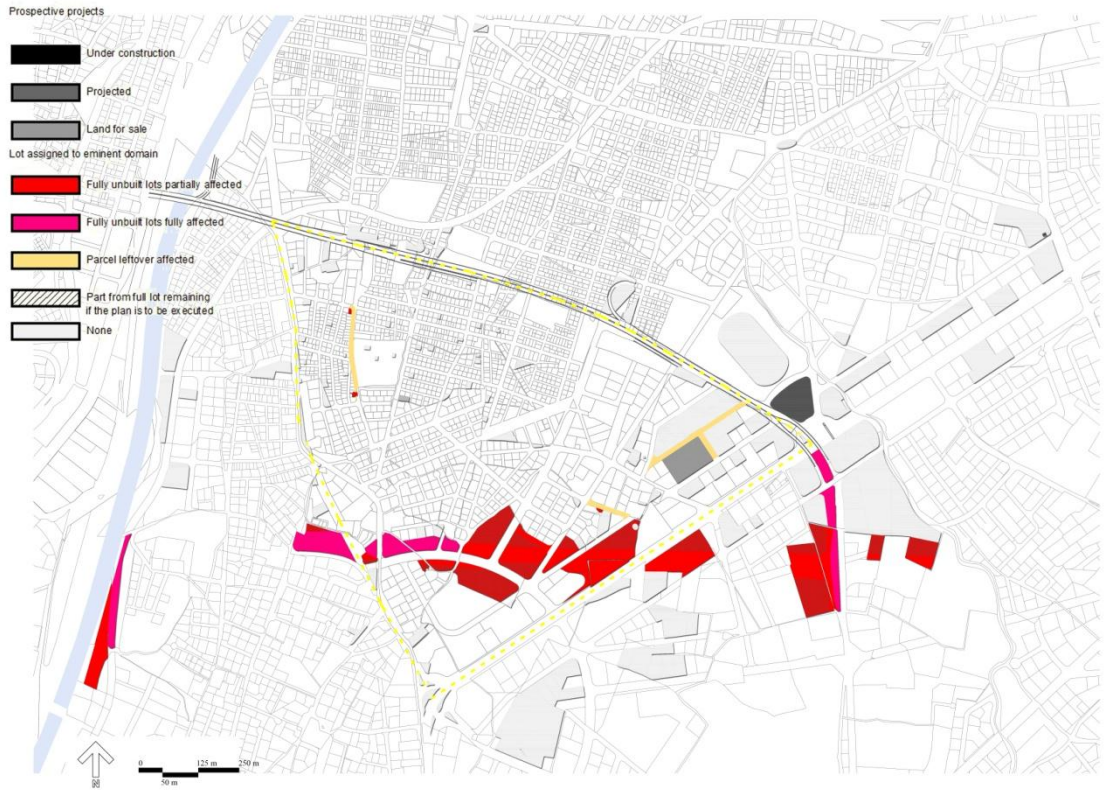


Figure 96: Prospective projects

Prospective projects in the neighborhood are not many. The peripheries are the most vulnerable to having future projects since they are underdeveloped. Furthermore, lots southward of Nabaa are crossed by the unexecuted Ecochard highway. If the project is to be executed, the lots highlighted in pink will completely disappear.

8. Size

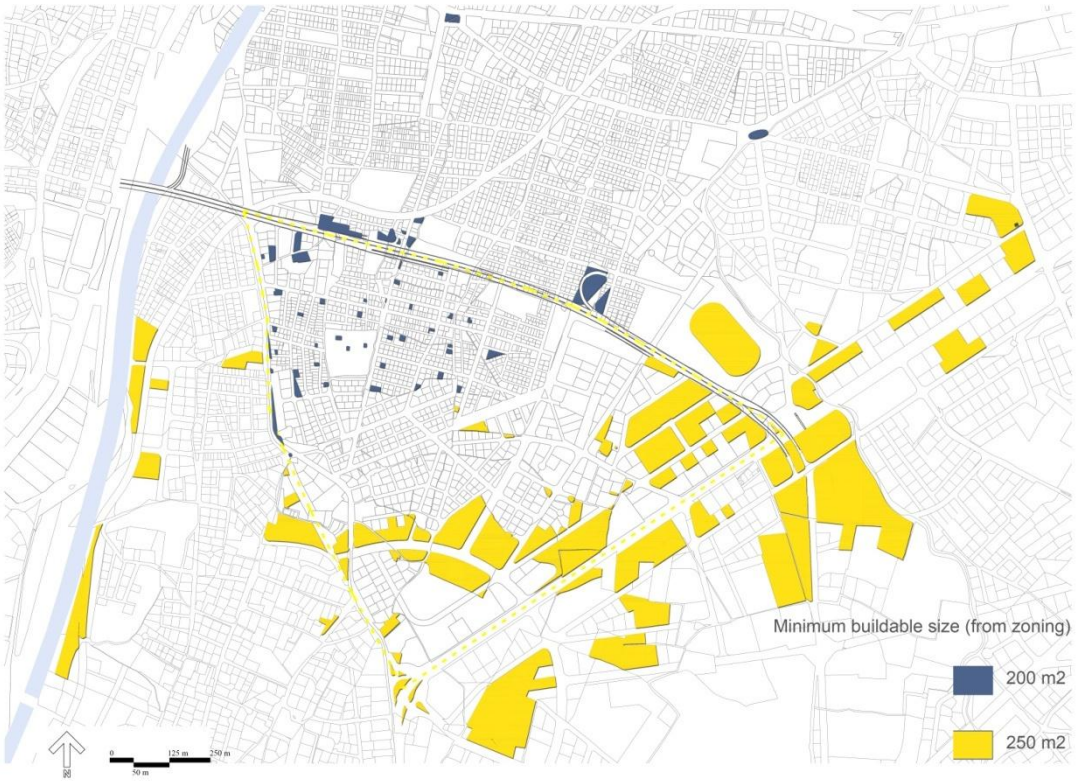


Figure 97: Minimum buildable size (Zoning)

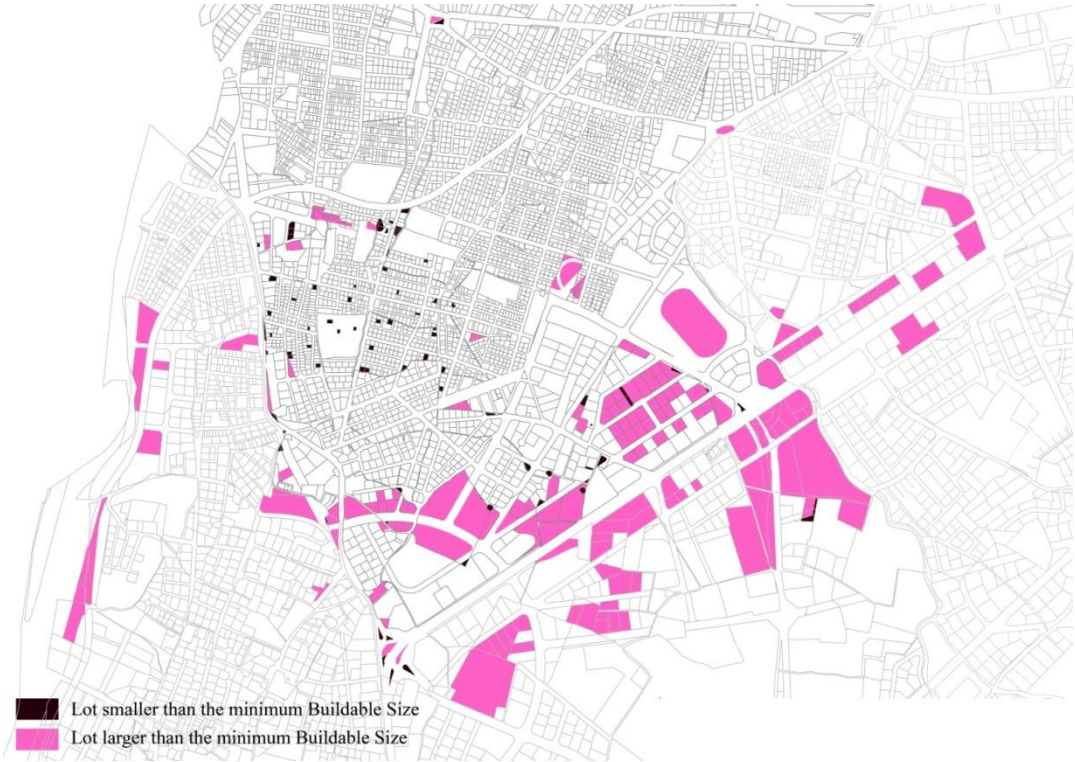


Figure 98: Buildable and unbuildable lots according to the minimum buildable size in the zoning regulations.

Following the zoning law elaborated on previously in Figure 24, we can notice that most of the lots have a minimum buildable size of 250 m^2. Furthermore, most of the lots located inside the neighborhood are smaller than the minimum buildable size, whereas on the periphery they are larger. Hence, small lots inside the neighborhood can't be built but can have other uses, whereas on the periphery lots are awaiting future development.

9. Criteria for urban agriculture:

a. Susceptibility to change

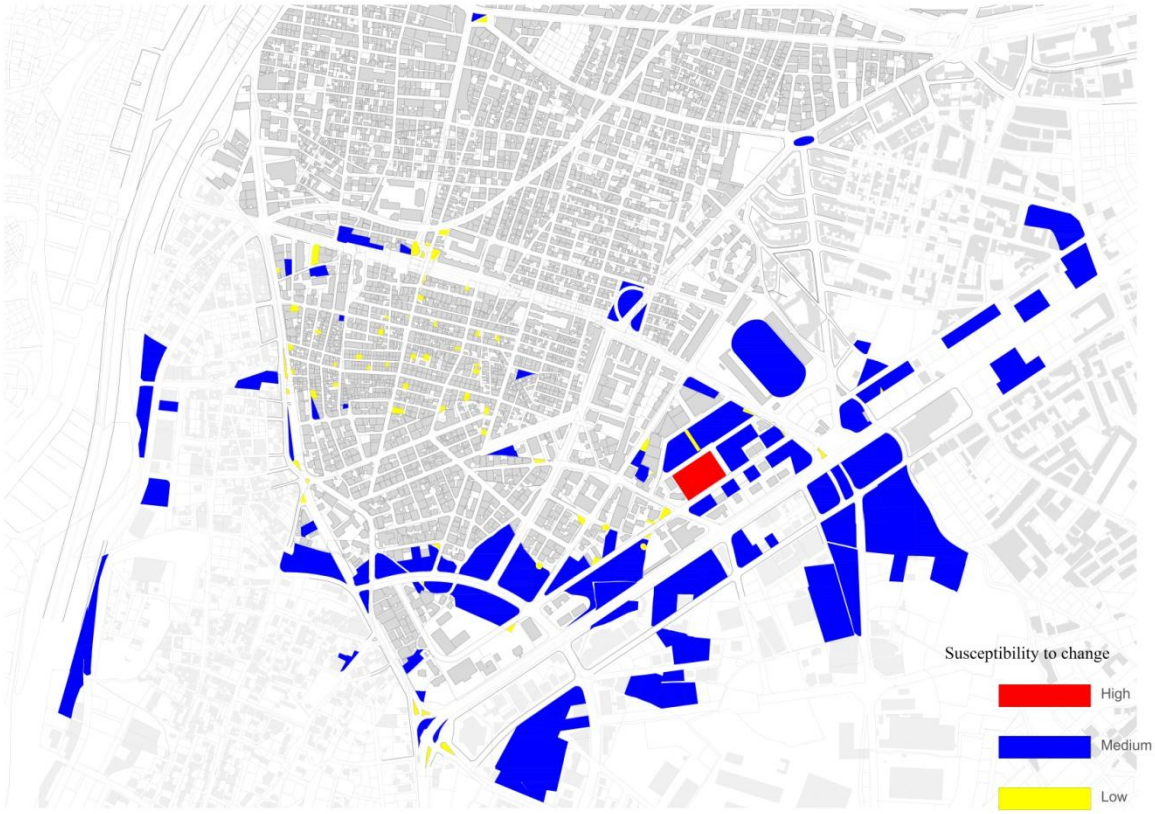


Figure 99: Susceptibility to change map

Susceptibility to change informs about the temporality of the proposed intervention. When the lot size is less than the minimum buildable size, the lot is low susceptible to change. Most of the lots have medium susceptibility to change. Inside the neighborhood, small unbuildable lots have a lower susceptibility to change since they can't be built.

b. Suitability for urban agriculture

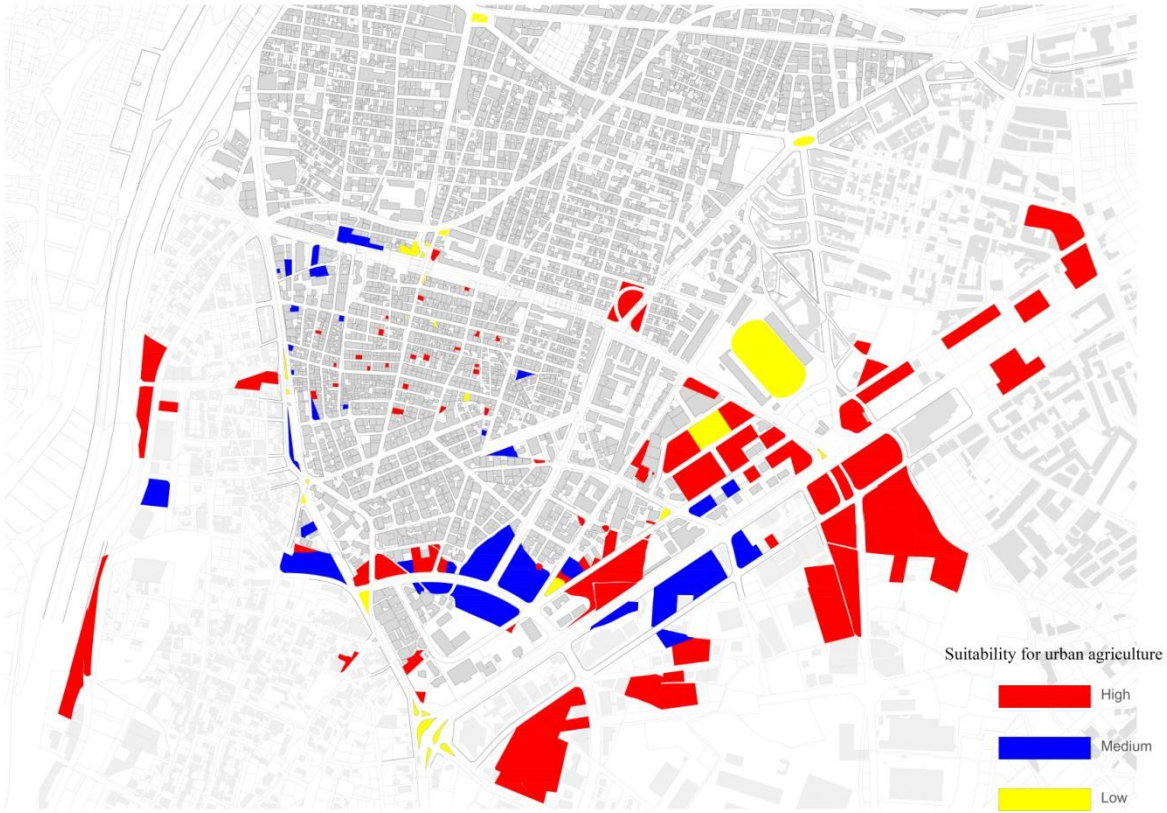


Figure 100: Suitability for urban agriculture

While vacant lots are the greatest opportunity for conversion to urban agriculture, not all of them are available or suitable for such use. They can have an existing designated use or existing removable structures.

c. Potential for planting

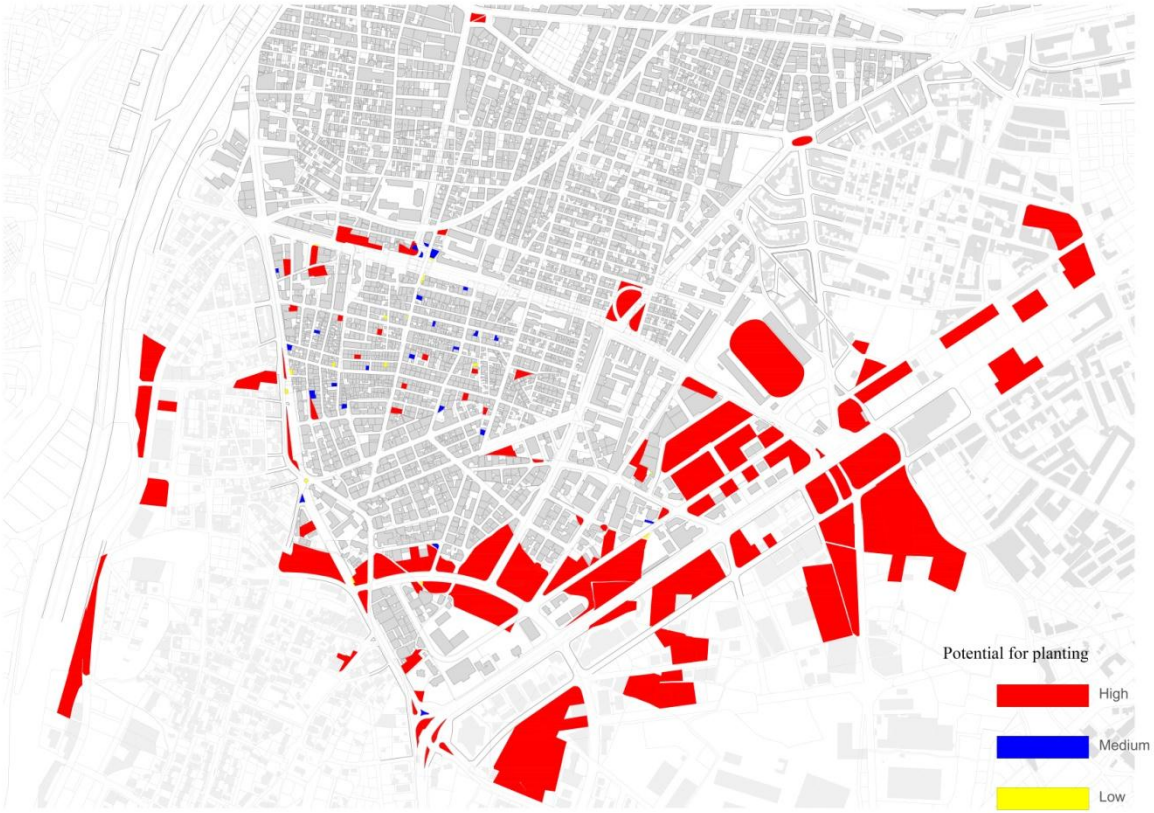


Figure 101: Potential for planting

Most of the lots have high potential for planting; hence they have high capacity for production.

d. Conclusion map

These 3 criteria or possibilities were combined for each unbuilt surface and resulted in a conclusion diagram map

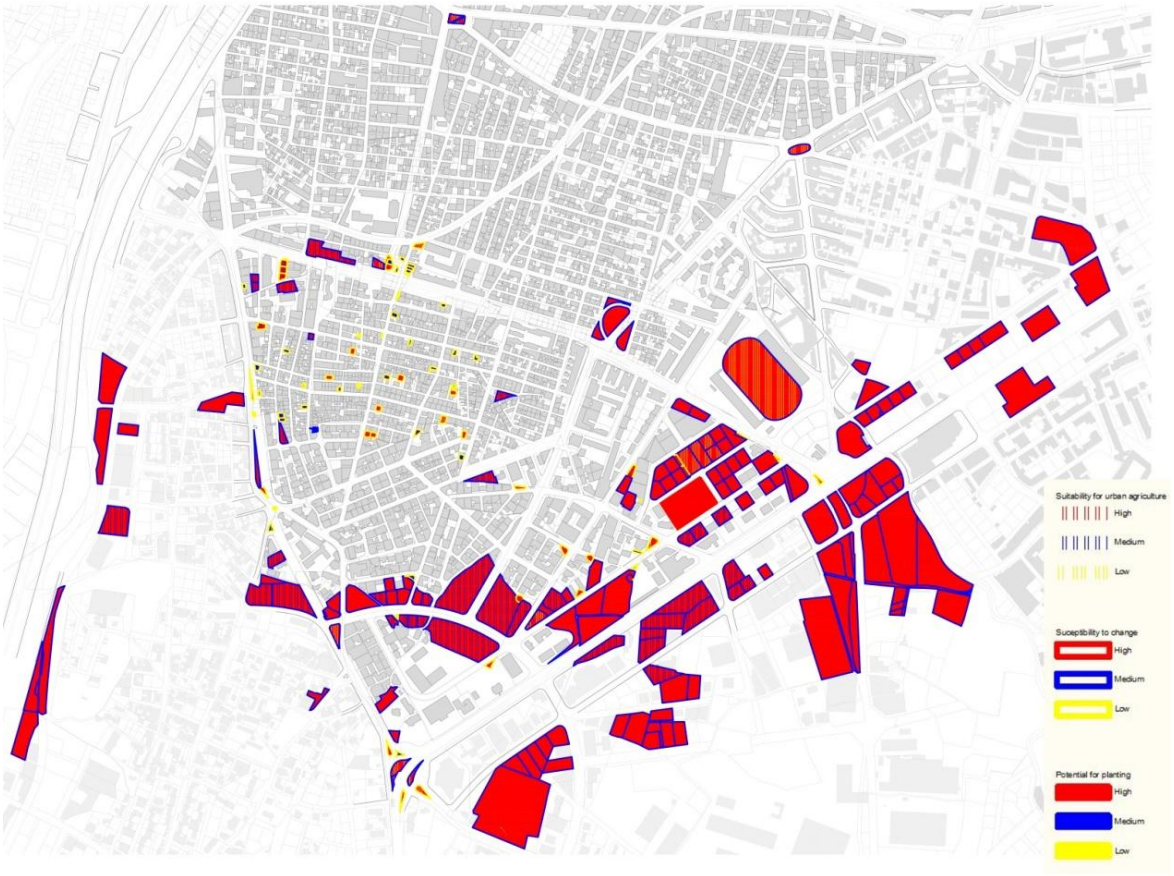


Figure 102: Conclusion map overlaying the 3 criteria: Susceptibility to change, suitability for urban agriculture and potential for planting

The map shows that most of the low susceptible to change lots have a good potential for planting.

CHAPTER VI

URBAN DESIGN STRATEGY AND INTERVENTION

A. Urban agriculture supporting sustainable livelihoods in Nabaa

I propose in this chapter an intervention strategy inspired from the exiting neighborhood's practices and needs identified in earlier chapters. How to integrate urban agriculture strategies on different types of built and unbuilt spaces such as land, buildings and streetscapes to become productive spaces without compromising other uses and to improve livelihoods of communities through food production and recreation? Urban agriculture in this proposed intervention refers to planting activities by urban households or organizations (such as schools, NGO's, etc…) on pieces of land allocated to them by the municipality temporarily or permanently for growing edible crops, as well as on streetscapes, building roofs and walls whenever conditions permit[13]. Assuming the supporting role of the municipality and local authorities identified at the

[13] The intervention does not include livestock production.

end of this chapter, an urban agriculture intervention within the context of Nabaa can be summarized in 3 concepts:

(1) The intervention would create new opportunities of urban agriculture 'productive pockets' that encourage optimization of use of available spaces by repurposing the available underused vacant land, interstitial spaces, streets as well as building roofs and facades.

(2) The intervention would connect these spaces and communities together though a network that links the spaces inside the neighborhood together as well as linking the neighborhood to its peripheries.

(3) The intervention would improve livelihoods by:

- Providing multifunctional and productive accessible shared open space
- Creating a system of local food production
- Contributing to food security and alleviating poverty by reducing on costs of bought fruits and vegetables.
- Creating job opportunities
- Supporting the existing fruit and vegetable market and directly linking with consumers
- Promoting social interaction and cohesion
- Involving the diverse community and different users in the food production in this area. Neighborhood residents, both long-timers and newcomers, especially children, women and unemployed individuals as well as members of communities such as schools and universities can plant in selected places for home consumption or for selling.

- Connecting the proposed open spaces and landmarks within different sections of the neighborhood. The intervention encourages connections to the upper part of Bourj Hammoud as well as the surrounding neighborhoods of Dekwaneh, Bouchrieh and Sin El Fil, challenging the connectivity issue to surrounding neighborhoods.
- Creating well-being and improving walkability experience.
- Protecting the few remaining open spaces within the neighborhood.
- Enhancing the built environment.
- Contributing to greening the neighborhood.

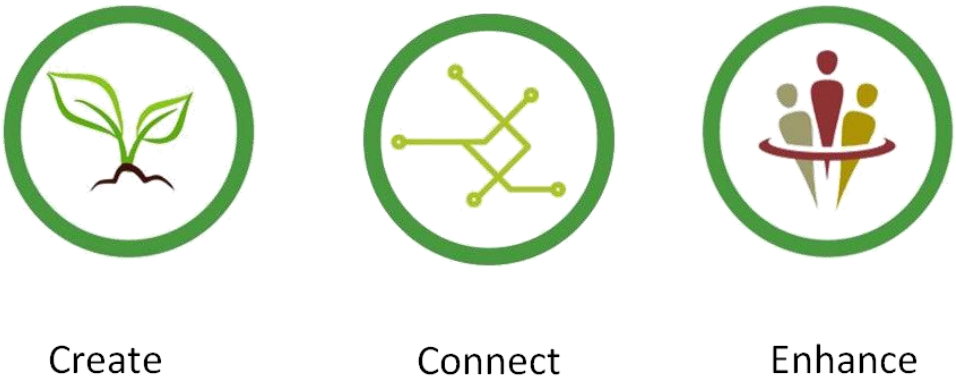


Figure 103: Urban agriculture in Nabaa creates new interconnected productive spaces in order to enhance livelihoods in the neighborhood.

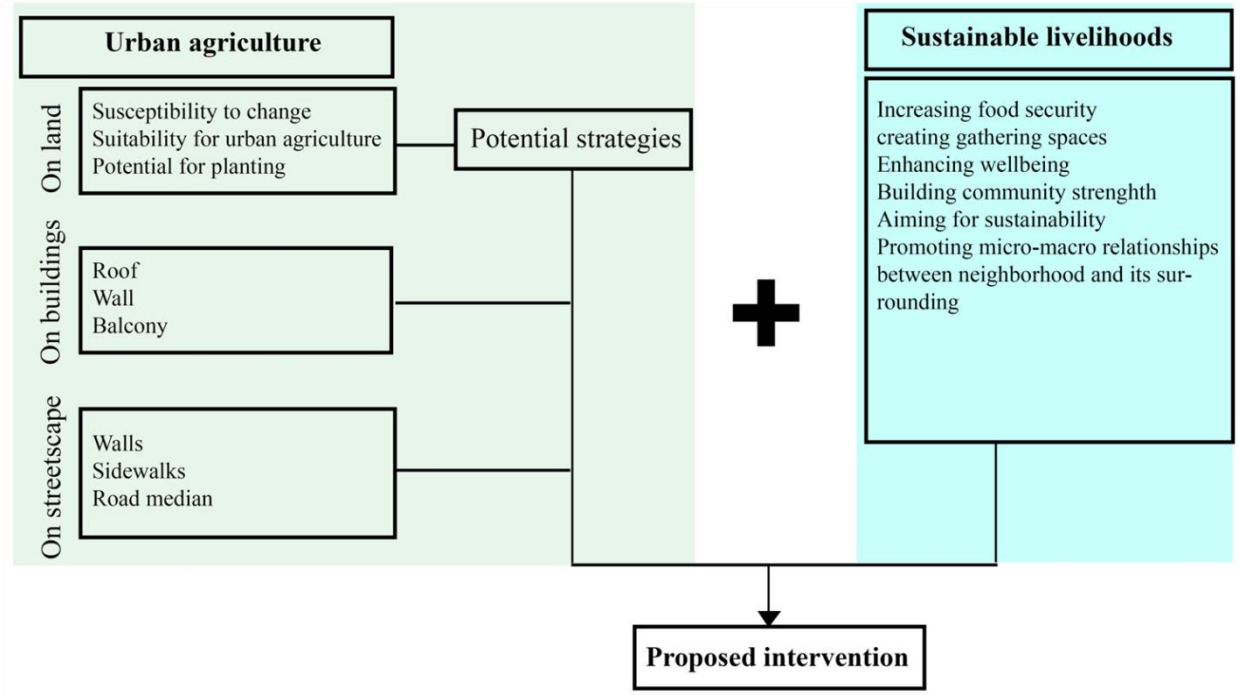


Figure 104: Intersecting urban agriculture and sustainable livelihoods

In this section I propose a minimal intervention emanating and adapted from people's practices through the multifunctional dimension of urban agriculture. Based on different typologies of open spaces in the neighborhood and its peripheries analyzed in the previous chapter, I develop a model of strategies for the multiple types of available open spaces. I then assess the contribution of each strategy to livelihoods and provide specific design solutions for each type of potential surface in the neighborhood.

B. Urban design intervention strategy

1. Five strategies

Based on the combination of the 3 criteria analyzed previously for each studied unbuilt lot (i.e. susceptibility to change, suitability for urban agriculture and potential for planting), I develop 5 potential strategies for urban agriculture on land and vertical surfaces in Figure 105, elaborated in Table 2 and assess their contribution to the livelihood of the neighborhood illustrated in Figure 106. These strategies provide different set of possibilities that could occur on lots sharing similar criteria.

Strategy #	**Possibilities**			**Urban Agriculture Strategy on Land *(directly in soil or in raised bed)* and on alternative surfaces *(Vertical surfaces)***	**Community Livelihood impact**
	Susceptibility to change	**Suitability for urban agriculture**	**Potential for production**		
Strategy 1	**High**	High, Medium, Low	High, Medium, Low	**Description of current situation:** A project is under construction or acquiring a building permit. **Strategy:** Since this project is underway I suggest to take advantage from this situation and to integrate in the building regulations the provision of open space and permanent spaces for urban agriculture (land, walls, roofs, and balconies). This would be supported by the municipality, and will follow these principles: a certain percentage of the available land will be allocated to agricultural practices or integrated within certain functions such as the provision of parking spaces. In addition balconies and roofs can be used for production. **Contribution:** In this context urban agriculture will contribute more to greening (Esthetical dimension) rather than pure food production. It will also contribute on an individual level rather than on a community level.	Low

Strategy #	Possibilities			Urban Agriculture Strategy on Land *(directly in soil or in raised bed)* and on alternative surfaces *(Vertical surfaces)*	Community Livelihood impact
	Susceptibility to change	Suitability for urban agriculture	Potential for production		
Strategy 2	Medium , Low	**Low**	High, Medium , Low	**Description of current situation**: Lot is fully used. **Strategy**: Planting on land is not possible. Integrate within the existing function temporary or permanent agricultural practices on vertical surfaces such as walls or fences. **Contribution:** The contribution is minimal and will most probably benefit people that are already using the land rather than the community as a whole.	Low
Strategy 3	Medium , Low	**Mediu m**	High, Medium , Low	**Description of current situation:** Lot is partly used as playground, parking or storage/business. **Strategy:** Temporary or permanent agricultural practices will be integrated with the already existing function of the lot by: (1) Planting on land if space is available. (2) Planting on vertical surfaces such as walls or fences is also an option in case space is not available to plant on land. (3) Mixing both. **Contribution:** If the lot has public access such as playground, unbuildable, or it has a large area (>50 m^2) it has a higher contribution on a community level than smaller lots. Furthermore Lots that are low susceptible to change can host permanent activities while medium susceptible to change can host temporary activities.	Medium

Strategy #	Possibilities			Urban Agriculture Strategy on Land *(directly in soil or in raised bed)* and on alternative surfaces *(Vertical surfaces)*	Community Livelihood impact
	Susceptibility to change	Suitability for urban agriculture	Potential for production		
Strategy 4	Medium, Low	**High**	Medium, Low	**Description of current situation:** Lot is unused or has remnant agricultural activities or vegetation. Lot area is smaller than 100 m^2 **Strategy:** (1) Planting in raised beds if soil is not available or planting directly in land if soil is available after adding soil amendment. (2) Planting on vertical surfaces such as walls or fences is also an option assisting planting on land If the lot is medium susceptible to change, the land will be used temporarily until it reaches a point where there is a building permit. It will not include heavy permanent structures. Suitable for supportive agricultural practices. **Contribution:** Since it is unused and medium size, these lots have a great potential for communal activities.	High
Strategy 5	Medium, Low	**High**	High	**Description of current situation:** Lot is unused or has remnant agricultural activities or vegetation. Lot area is larger than 100 m^2 **Strategy:** The lot is suitable for heavy planting generating higher yields on permanent or temporary basis according to the susceptibility to change. This is suitable for agriculture as a business that could be used by street vendors, or fruit and vegetable shop owners in the neighborhood for commercial purposes. **Contribution:** The highest contribution will be if the lot is low susceptible to change since it will have a permanent dimension.	High

Table 2: Five strategies for introducing urban agriculture on different surfaces

Figure 105: Five strategies

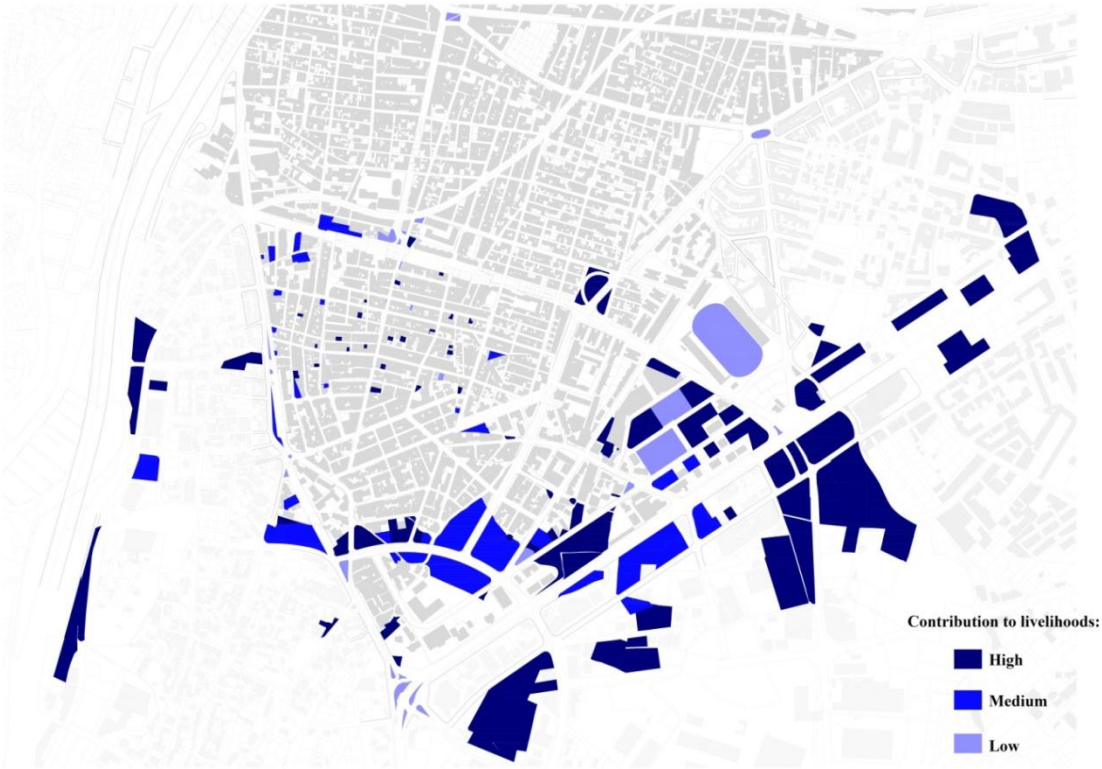


Figure 106: Livelihood contribution of the 5 strategies

Strategy	Corresponding Area
Strategy 1	5318.9 m^2
Strategy 2	22411.9 m^2
Strategy 3	51997.7 m^2
Strategy 4	1475.1 m^2
Strategy 5	172431.9 m^2

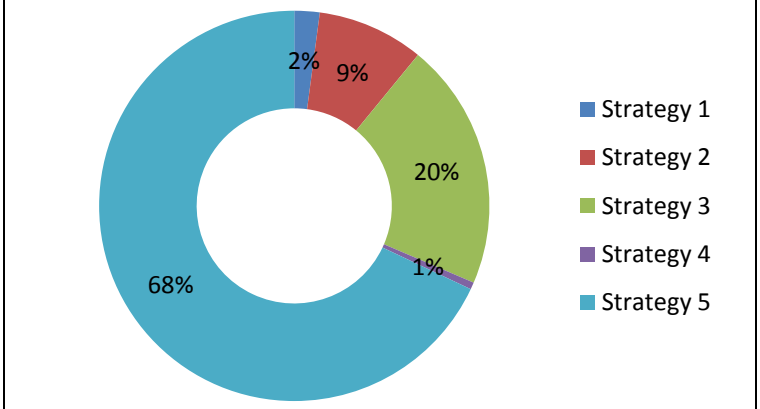


Table 3: Area for each of the five strategies. It is important to note that this includes area on for urban agriculture on land and does not include vertical surfaces.

2. Surfaces for urban agriculture

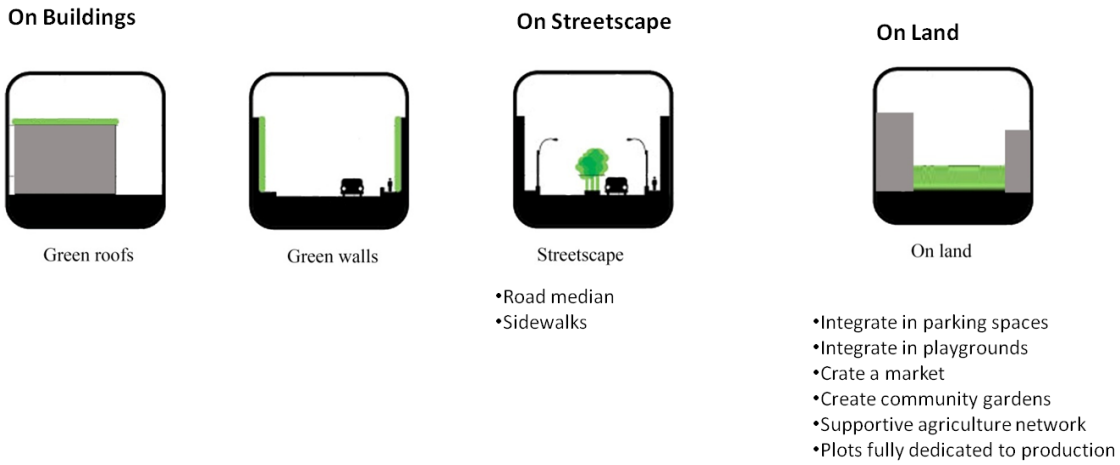


Figure 107: Surfaces for urban agriculture in Nabaa

The strategy will be applied on different types of built and unbuilt surfaces: streetscape, building and land.

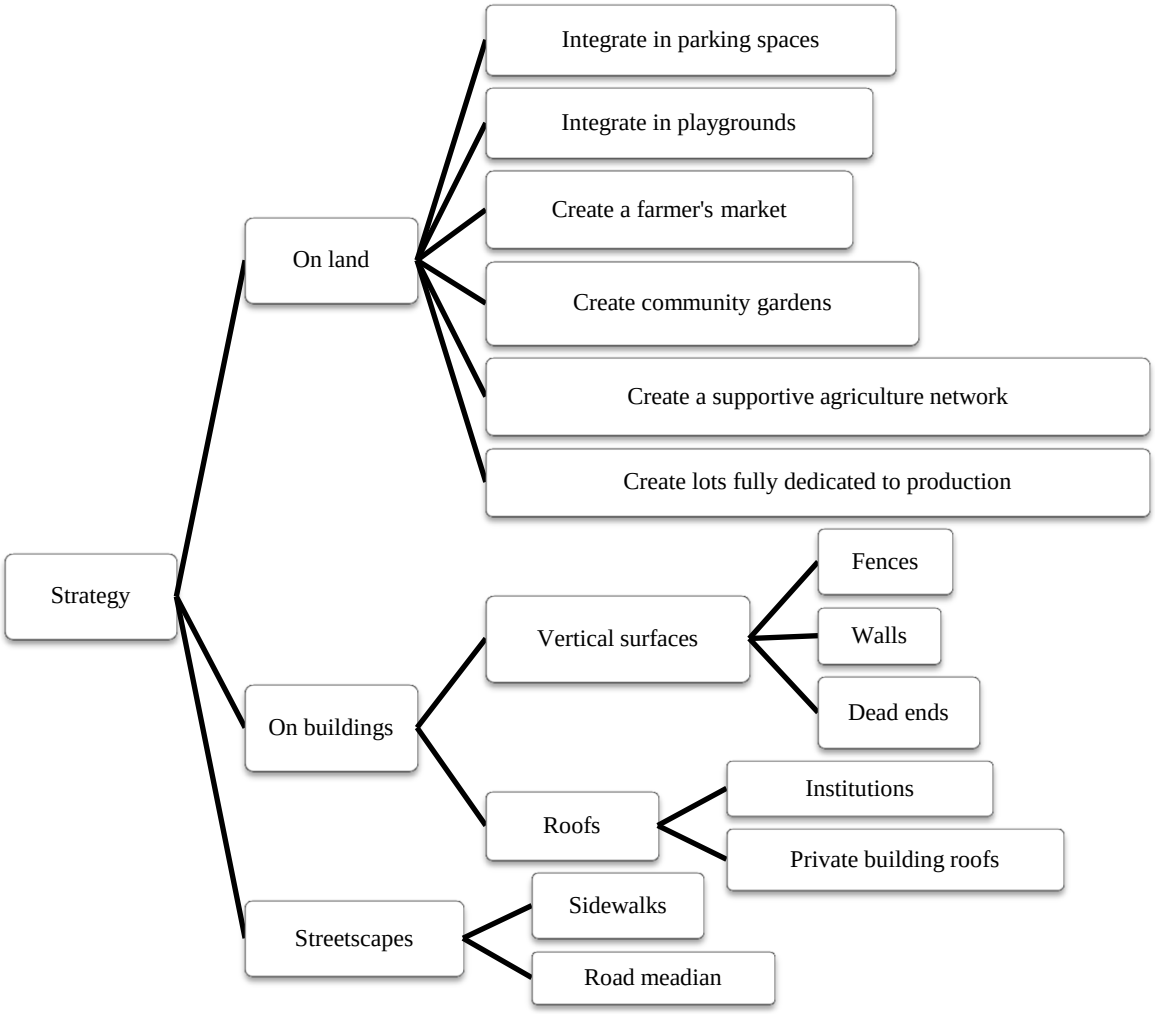


Figure 108: Surfaces and options for urban agriculture associated with function

a. <u>On land</u>

Based on formalizing existing practices in the neighborhood, existing vacant lots in the neighborhood would convert to green pockets of urban agriculture, repurposed as places for social interaction such as community gardens (Figure 110) or places for heavy production of fruits and vegetables used for commercial purposes

(Figure 111). These spaces take the form of productive landscapes servicing the community.

The intervention will be based on sustainable tools of intervention and will have supporting activities for urban agriculture such as:

- *Garbage sorting:* Providing the neighborhood with recycling bins in specific spaces will help in sorting the garbage for the local garbage collector and reducing street littering around street corners. Bins dedicated for organic waste collection originating from household and commercial use of fruits and vegetables will help in reducing organic waste and assist in producing compost and growing medium for the crops to be grown.
- *Upcycling:* The intervention is also based on existing practices in the neighborhood such as repurposing unused materials as containers. The unused rods originating from structures of the amusement park can be used for creating greenhouses.
- *Assistance or support stations for urban agriculture:* NGO's can have support stations in the neighborhood for providing assistance regarding agricultural practices such as providing seeds, tools, teaching how and when to grow, etc…
- *Water collection*: using water efficient systems such as water collection from the roofs, from air conditioning units or creating water collection units
- *Fruit and vegetable market:* A market is proposed under the bridge to sell fruit and vegetables produced in the neighborhood. Branding Nabaa's agricultural products could be used as a marketing strategy and part of promoting the urban agricultural landscape proposed. Fruits and vegetables in addition to traditional food products produced by the residents can be sold.

- *Other services include:*
    - *Packaging station:* packaging stations will be dedicated for packing the fresh produce.
    - *Parking for push cart vendors:* Specific areas will be allocated for push cart vendors to park their carts at night.

Figure 109: Urban agriculture components in the neighborhood.

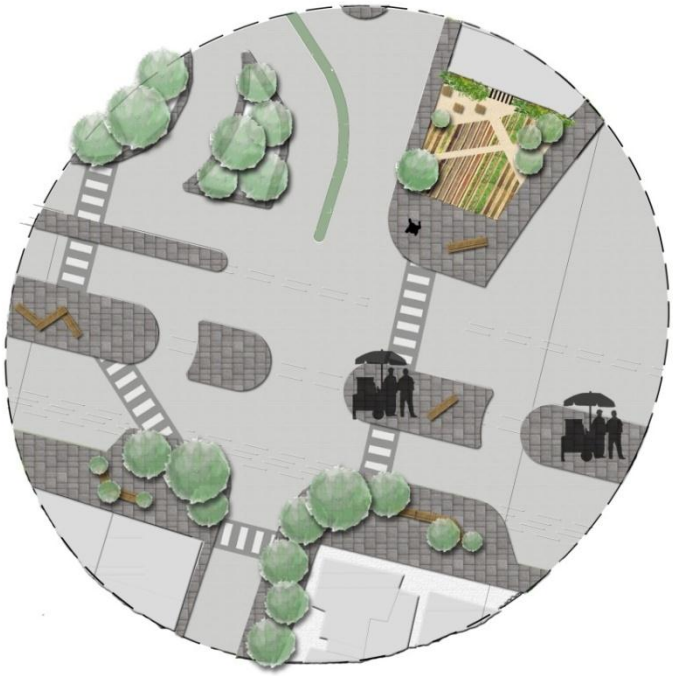


Figure 110: Potential space for community garden with supportive agricultural activities before and after design on a municipal land along Yerevan flyover. (Strategy 4).

The neighborhood residents seem to prefer movable small structures. In the case of community gardens, mobile gardening like in the case of Berlin can offer flexible solutions, especially for temporary interventions on lots that are highly susceptible to change. It will also allow the users to easily move the containers to other locations.

Figure 111: Large lots on the neighborhood's periphery can be used for heavy agricultural production dedicated for commercial purposes. (Strategy 5)

Figure 112: Proposed market under the bridge

Figure 113: Integrating edible landscapes in Bourj Hammoud playground (Strategy 3)

Figure 114: leftover open space within a built lot near an abandoned building.

Figure 115: Integrating recycling bins for organic waste to produce compost

Figure 116: Conceptual collage of different options for integrating edible landscapes along a pedestrian street that is restricted for vehicular access.

Figure 117: Integrating grape vines in spaces fully used as parking spaces inspired by the existing practice in the neighborhood (Strategy 2)

b. On buildings

i. Roofs

When conditions permit, residential and institutional building roofs will be converted to edible gardens. Since the condition of residential roofs is deteriorated and often used by residents, the strategy for green roof concentrates on planting on unused roofs of identified institutional buildings such as NGO's, schools, universities and religious institutions. These have the capacity to introduce and maintain their roof but also they are major hubs potential to gather people and will act as the "hosting institutions" for urban agriculture. The total area of identified roofs sum to 24 639 m^2. However not all of it will be used for planting, some space is dedicated for recreation, tool storage, water collection, planting and propagation area, etc…

For buildings acquiring building permits, edible garden can be planned ahead of time to be integrated on the roof (Figure 118).

Figure 118: Integrating edible garden on prospective commercial project. Fruit trees are integrated in the parking area (Strategy 1)

ii. Walls (building facades, dead ends and fences)

Building facades

Vertical agriculture can be implemented on the building facades. In many cases on the sidewalks, air conditioning units are dripping water on the floor.

Condensed water could be collected from the AC unit, and after adding some nutrients it could irrigate the green wall system (Figure 119).

Figure 119: Green wall with water collection for Air conditioning units inspired from the “green wall” in the neighborhood.

Dead ends

Dead ends in the neighborhood can be “activated” to provide spaces for fruit and vegetable production. The wall can be used as a growing surface, like many residents are already doing.

Figure 120: Green wall on a dead end in Nabaa.

Fences

Fences can be used as a growing support for either climbing plants or to be used as containers.

Figure 121: Example of fence made of upcycled wooden pallets used for growing plants. Source: www.inuag.org

iii. Balconies

Balconies can assist in small scale food production for household consumption by growing in pots inside the balcony or hanging pots on the balcony edge or handrail.

Figure 122: Balcony gardening-eggplants and other vegetables in bottles. Source: containergardening.wordpress.com

c. The streetscape

Fruit trees along Nabaa's sidewalks whenever they are larger than 1 m will connect to the already existing edible streetscape implemented in the upper area of Bourj Hammoud. It will have the least impact on community livelihoods since it will contribute more to greening the neighborhood rather than heavy production. When the sidewalk is narrow, grape vines could be climbed on the wall (Figure 123). Residents can agree to manage and harvest the fruits along the streetscape.

Figure 123: Grape vines climbed on walls

3. Proposed urban agriculture network plan

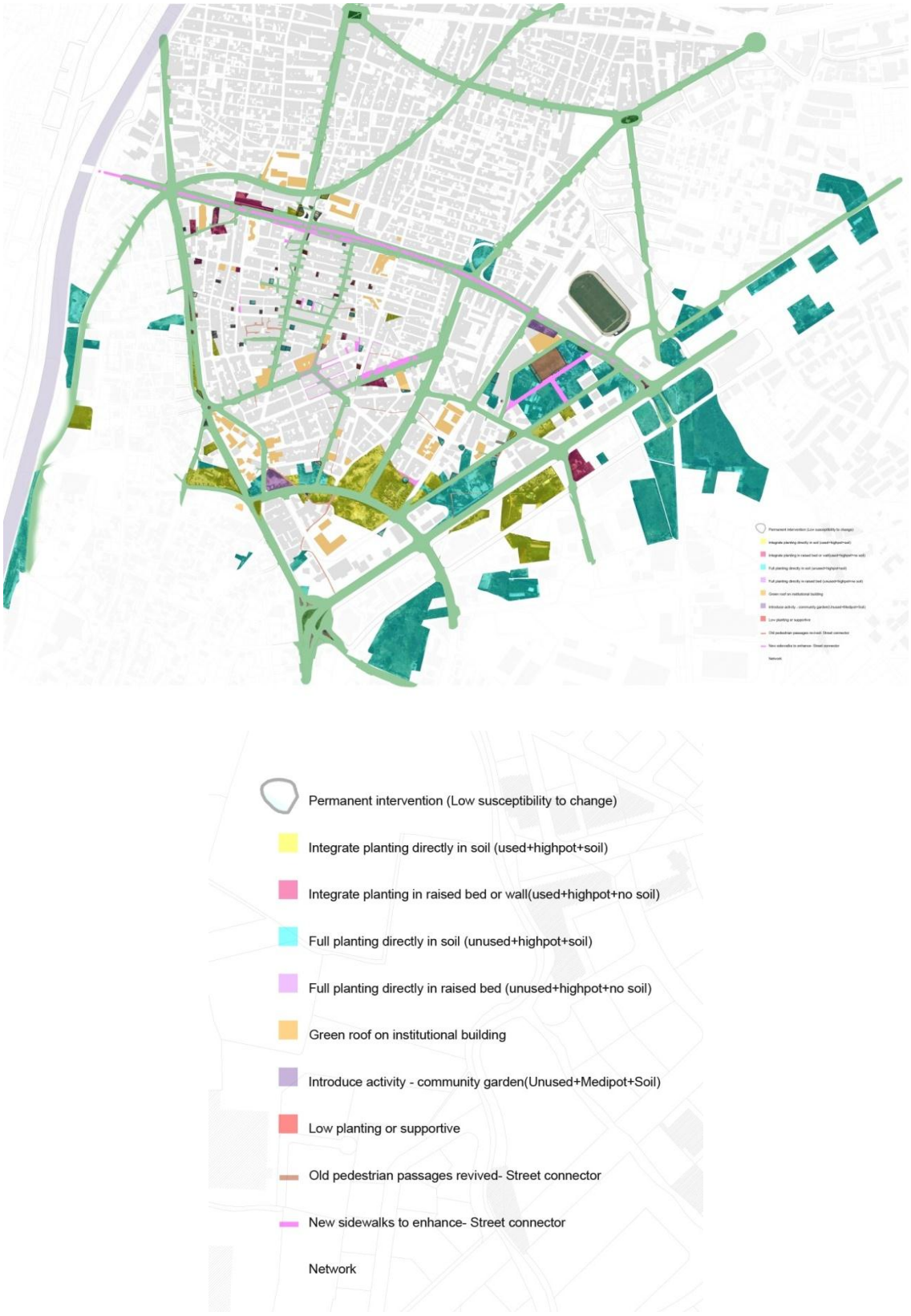


Figure 124: Proposed intervention plan

The proposed intervention plan combines the five strategies; surfaces (land, building, street) and types of planting (directly on land or in raised planters) and defines temporality. It can be summarized in 3 concepts regardless of their type of application (residential, roof, balcony, wall, streetscape, urban pockets):

(1) *Introducing* urban agriculture activities within already existing activities land (in already planned open spaces such as public parks, etc...) and on buildings (roofs and wall of schools, and institutions)

(2) *Creating* new spaces fully dedicated for urban agriculture.

(3) *Connecting* these spaces. A network will link major landmarks, services and institutions (schools, religious buildings, NGO's) to the new proposed spaces for intervention, acting as catalysts of urban agriculture. The old pedestrian streets will be revived. The connection is also to the surrounding neighborhoods as mentioned earlier.

Figure 125: Major nodes in the neighborhood. Permanent (line) and temporary (dotted line) hubs of urban agriculture

The urban agriculture network proposed a flexible and changing network over time consisting of permanent and temporary hubs of urban agriculture.

(4) For the system to run, the network will rely on the hub of public lots that are low susceptible to change and unused. They will form the core permanent network. Public lots and roofs of institutional buildings (Schools, religious, etc) which have a strong public access component will act as permanent social hubs bringing people together mainly integrating agricultural activities for recreation and small scale production.

(5) The supportive lots: Private lots that are medium and high susceptible to change will contribute to the network through temporary agricultural interventions and partnerships on private lands. They will add a temporary dynamic to the neighborhood. Large lots will be suitable for heavy

production/ intensive urban agriculture. It is also important to mention that for temporary interventions on private lots with areas larger than the required minimum building size[14], it is recommended to plant vegetables instead of fruit tress since the latter need more time to grow and bare fruits. It is important to note that leftover open spaces within built lots are also contributing to the network. Each piece will have a role in the overall network and in improving the livelihoods.

4. Assessing the contribution of potential urban agriculture strategies to livelihoods

My objective for the urban agriculture intervention is to improve livelihoods by providing productive multifunctional spaces and contributing to the food needs of the area beside the additional benefits stated earlier. The intervention will not change completely the livelihoods but can contribute to improving it. The intervention aims to translate the wellbeing concept into a physical intervention on two levels: (1) Improving the wellbeing on an individual scale (for example roof production, it involves minimal interaction) (2) Improving the wellbeing at the community level by bringing people together.

In order to know which lot contributes highly to the wellbeing of the neighborhoods, the five strategies were intersected with livelihood variables that urban agriculture has the potential to contribute to. It is important to note that not all spaces suitable for planting have high impact on livelihoods. Some small spaces can have great potential for gathering people inside the neighborhood hence have a high positive

[14] Since it is unknown when a project could be implemented.

impact on their lives. Therefore the contribution to livelihoods will help identify the role of each piece of land.

There will be a higher contribution to livelihoods in Nabaa neighborhood if (1) if the intervention is located inside the neighborhood rather than its peripheries or outside it (Figure 126), (2) and if there is a hosting organization such as NGO's or educational institution supporting urban agriculture.

Figure 126: Location of intervention

Quantification or estimate figure for production:

In order to assess to which extent the exiting food productive landscape contribute to securing food in the neighborhood, the example of tomato can be given. On average, tomato has an approximate density of 4 plants/ m^2 and an average yield of

3.5 kg/ plant (See appendix III)[15]. From the created network, we can estimate the amount of food that can be produced for the lots that were allocated for food production. If tomato plants were grown on 70% of the identified areas on land in the network dedicated fully for planting[16] , 1.7 tons of tomato can be produced per season. A household consisting of 8 persons consuming around 3 kilos of tomatoes/week can save around 15 000 LL/Month for tomatoes.

Of course, assessing the contribution of urban agriculture to food security is much more complex and many aspects should be taken into consideration such as the capacity of production, surface area and plant type. Expected yields vary with seasons, care, soils, pest pressures and cultivars. However it was simplified here in order to show how small spaces can add up to make large quantities of food and contribute to livelihoods.

5. Creating incentives

The proposed intervention will cross religious boundaries and community groups and will aim to create common incentives for people to work together, inside their neighborhood and on its peripheries. Based on a questionnaire that asked people what would motivate them to plant and be part of the urban agriculture system, I looked at different possible incentives:

Cultural significance: In order to encourage planting, many fruits have symbolic cultural associations. Planting certain types of fruits and vegetables could create a sense of place. For example, pomegranate has been adopted as a symbolic fruit referring to Armenians life and survival.

[15] it can reach up to 15 kg/m^2 in high yields
[16] Surface area of lots fully dedicated for planting is estimated at 174 372 m^2

Common good: In order to involve the community in planting practices, urban agriculture has a "common good" for incentive. Focusing on the 'public' and the 'shared' could present choices for everyone equally.

Personal benefits: Many are interested in planting their own food since it will provide healthy food; create wellbeing and personal satisfaction as well as cutting on costs.

Municipal support: The municipality can create incentives for people to plant by reduction municipal fees or other services such as water tariffs or imposing land taxation for landowners on underdeveloped unused lands.

6. Technicalities

Plant material, light, growing medium, water and management are the five main components for planting. They are described below:

- *Plant material/Crop Selection:*

In order to select suitable crops to be planted in the context of Nabaa, a research was conducted on different edible crops (fruits and vegetables) that are suitable for Nabaa appended to this thesis. The selection focused on locally grown crops that tolerate the climate of Bourj Hammoud. The selection also includes historically grown crops in the area such as orange trees as well as fruits and vegetables that are frequently consumed that were retrieved from the questionnaire and from observing the types sold by shops and street vendors.

It is important to note that planting crops in sequence according to seasons can increase yields. In urban coastal areas one can produce up to 11 month per year. This

will increase yield and food security, especially if the crops are covered or grown in greenhouses during winter.

- *Growing medium:*

Growing in urban soils often is synonym with polluted soils. In places where soil is available and contaminated, it should be replaced or treated depending on the situation. In places where soil quality is poor, the soil can be amended. Setting up a neighborhood compost system will help produce soil amendments for the neighborhood. Vermicompost is one system that could be implemented. Other growing systems such as hydroponics can also be used.

- *Light:*

The more sun these crops get, the better it is. However in cases of low light some crops will spout even with limited sunlight. As a general rule, plants grown for their stems, leaves or buds generally tolerate light shade well. Those grown for roots or fruits tend to need more sun. In case the latter are grown in semi shade, they will provide smaller yields and are noted in the table below with (partial sun). Nearby bright and light surfaces such as white walls can increase the amount of light captured by plants.

On the streetscape and in places where only low light is available, artificial lighting could be provided acting both as an actor for plant growth and providing lighting for unlit streets and alleyways at night.

- *Water:*

Water is an issue in Nabaa and the agriculture system could not rely solely on the existing water system. In order to integrate sustainable solutions, different options are taken into consideration:

- Rain water collection from buildings (Air conditioning units or from the roof)
- Rain water collection ponds for shared common spaces
- Integrated water recycling system

- *Management:*

Pest and disease management: Walls and branches can block air flow hence allowing moisture and encouraging disease. An ideal scenario is to plant crops with more space between them in shady areas and to water prudently only the root area and not the leaves.

- *General recommendations:*

It is encouraged to:

- Plant the crops in their season
- Plant the crops that are easy to produce and reproduce
- Plant crops that produce larger yields per plant
- Plant crops that are low maintenance, don't require lots of water, are pollution tolerant, not very soil specific (potatoes for example require a soil high in iron), and can tolerate partial shade since it is an urban dense setting. Plant the crop in its most suitable system (Roof, wall, land).
- Ensure seasonal variation in productivity in order to better satisfy food requirements throughout the year.

C. Urban governance strategy: A supported productive neighborhood

Looking at different stakeholders will help identify potential target groups that could help in initiating, running, and managing the intervention in Nabaa. If the project

is to be implemented, governance stakeholders need to be involved in this process. It is important to acknowledge the role of existing stakeholders and potential ones that would support urban agriculture. An overview of potential stakeholders for urban agriculture that need to be considered is listed below:

Ministries: The lack of government initiatives, as well as problems with land tenure and market land prices, will stand in the growth of urban agriculture in cities like Beirut (Zurayk). Therefore; among the major steps that can be taken to encourage urban agriculture is its promotion by the government through its ministries (such as the ministry of agriculture), or through governmental organization working under the ministry of agriculture's supervision such as the Lebanese Agricultural Research Institute (L.A.R.I).

Municipality: Municipalities are important decision-makers and their contribution may allow the elaboration and implementation of urban agriculture. The municipality should play a role, not only as a stakeholder but also as an initiator, in protecting existing sustainable practices as well as promoting new ones such as urban agriculture.

Community groups and NGOs: They are pivotal players in supporting urban agriculture. One of the most relevant NGO to urban agriculture is the World Vision who is already working in the neighborhood through their "Food and Livelihood Security Program". Cooperation can occur with a "community committee" (لجنة أهالي) with NGO's where they can work together to make Nabaa a productive and sustainable neighborhood, through empowering families and interdependent communities and promoting urban agriculture. Other local NGO's such as "Difaf" (ضفاف), "Soils permaculture association" as well as international organization that promote community

development and sustainable agriculture such as the International Fund for Agricultural Development (IFAD), the Resource Center on Urban Agriculture and Food Security (RUAF), UN agencies (such as UNDP and FAO) and the Near East Foundation could be potential stakeholders of the project.

Private sector: The contribution of the private sector such as professional groups in schools and universities such as ESDU (Environment and Sustainable Development Unit) in AUB, as well as banks and enterprises can help in contributing and promoting urban agriculture through programs and partnerships with NGOs.

In an ideal case scenario, I propose to have a team that brings together different stakeholders inside the Bourj Hammoud municipality and the surrounding Sin El Fil, Bouchrieh and Dekwaneh municipalities. The team would identify problems and opportunities in the municipal territory and develop a municipal action plan for integrating and promoting urban agriculture.

Stakeholders		Role in UA
Community	Shop owners Street vendors Residents Households Community activists Unemployed University and School students	Involved in planting, producing, consuming, selling, and creating spaces
Public sector (Local Authority)	Bourj Hammoud Municipality (Municipal council) and neighboring municipalities Ministry of agriculture	Supporting role
NGO (Local and international)	World vision	Technical assistance Financial contribution
	World Bank	
	WHO	
	UNHCR	
	Local NGO's	
Private institutions and Land lords	Owners of private lots, educational and religious institutions	Agreeing with authorities about using the land for agricultural practices.

Table 4: Inventory of involved parties for the proposed intervention in Nabaa

CHAPTER VII

CONCLUSION

A. Research findings

In conclusion, an urban design strategy was formulated based on connecting the framework of sustainable livelihoods and urban agriculture. While its impact on urban diets and income creation should not be overstated, the intervention highlights the multi-functionality aspect of urban agricultural interventions, creating shared spaces in which the different communities find a stake in improving the livability of the neighborhood while responding to the three issues in sustainability, i.e. environment, community, economy.

B. Research contribution

As stated previously, most of the available literature on urban agriculture comes from Europe or the United States; where urban agriculture is conceived strictly as an urban greening strategy and fail to take into consideration how this strategy can be an effective tool in directly improving livelihoods especially in disadvantaged neighborhoods with scarce open space. Hence, my research can contribute to the applicability of urban agriculture in a developing country, on a neighborhood scale in the context of a low income neighborhood. It also investigates the potentials of urban agriculture as a strategy not only for reducing food insecurity but also providing multifunctional spaces, offering opportunities for primarily recreation and social interaction and secondary employment.

C. Research limitations

In addition to the technical limitations mentioned in the research methods, I list here the research limitations:

- Quantifying the neighborhood needs in terms of fruits and vegetable requirements was beyond the scope of this thesis especially that no data or survey is available regarding food consumption and composition of the neighborhood (distribution of the neighborhood according to age range and sex) (Orsini, 2014).
- Quantifying the economic contribution of urban agriculture on the household level and to the local economy of the neighborhood was beyond the scope of this research. However it is predicted that the intervention will not make a significant contribution to fruit and vegetable requirements of the neighborhood since it is very dense, however it has the potential to fulfill several other needs contributing to livelihoods as demonstrated in this thesis.
- This research didn't take into consideration livestock production which would increase reduction on costs and food security if complemented with crop production.
- Absence of fine resolution data on type and health of soils
- In a complex and dense urban context of poverty such as Nabaa, with large social diversity, high population transience, low economic input/output, and marginality, assessing the extent into which urban agriculture can contribute in generating stability for the coexisting transient and stable populations as well as contributing to conflict resolution is difficult.
- The building age and condition of roof condition are important indicators that inform if the roof can be used as surface for planting. Since no data was available, the intervention targeted institutional unused roofs.

APPENDIX I

QUESTIONNAIRE

Questionnaire 1: Storekeepers

I. SHOP MANAGEMENT

1. Is fruit and vegetable vending your only source of livelihood? Or do you have another job? _____

2. From where do you purchase your products that you sell?

a. Sin El fil b. Other_____

3. Who delivers the product? a. Supplier b. Yourself c. Other _____

At what time? _____

4. How often do you bring products:

a. Daily b. Every other day c. Weekly d. Monthly e. Other:_____

5. Do you sell products on credit? a. Yes b. No

6. Work schedule:

a. Work hours: _____

b. Days of the week: _____

c. Work peak hour (selling most):_____

d. Briefly describe the main events of the day (receiving products, sorting, arranging on the shop, etc…..)

_____

_____

II. INTEREST IN AGRICULTURE

7. What do you do with perished/unsold products?

a. Throw. Where? _____ b. Leave for the 2nd day c. Donate, to whom?_____

d.Other_____

8. Have you recycled or reused any of the products you use in the store?

a. No b. Yes. What? _____How? _____

9. What kind of fruits/vegetables do you sell the most? _____

How much fruits and vegetables do you buy for selling on your store per week?

Fruits	Frequency of fruits bought per week	Average Value per unit ($ or LL)
1.		
2.		
3.		
4.		
5.		

Vegetables	Frequency of Veg. bought per week	Average Value per unit ($ or LL)
1.		
2.		
3.		
4.		
5.		

10. What kind of fruits and vegetables you never bring to your store? why?

_____

11. Have you ever planted before?

a. No b. Yes. Where?_____ What?_____

12. Do you grow any edible plants at home?

a. No b. Yes. Where? _____What?_____

13. What kind of fruits and vegetable do you consume the most at home?_____

14. From where do you get the fruits and vegetables for your own consumption?

a. From your own purchase b. from others,_____ c. other_____

15. How much do you pay per week for fruits and vegetables for your personal consumption?_____

16. Do you have any interest in planting fruits and vegetables?

a. Yes, for home consumption or for selling b. No, why? _____

c. What is the incentive to do so?

d. Who do you think might be interested in planting? _____ Why? _____

17. If you were given the opportunity to grow your own fruits and vegetables in Nabaa in

order to sell them and/or for your own home consumption, would you be interested?

a. Yes b. No. Why? _____

18. Do you think it is a feasible idea?

a. Yes. Why? _____

Where (Rank) ? __ Roofs, __Balconies , __Leftover land, __Streets,

__Walls, Other_____

b. No. Why? _____

19. What is your perception of vegetables and/or fruits grown on roofs, leftover land, balconies?

_____

20. What resources do you think you need (space for growing, place for storage, place for selling, resources, water, etc…)? _____

21. Do you know of any planting practices currently happening through personal initiatives or NGO's? Such as greening, roof planting, etc….?

a. No. b. Yes, Where? _____Who? _____

Questionnaire 2: Street vendors

I. ARRANGEMENTS:

1. Is fruit and vegetable vending your only source of livelihood? Or do you have another job? _____

2. From where do you purchase your products that you sell? a. Sin El fil b. Other_____

3. Who delivers the product? a. Supplier b. Yourself c. Other _____

4. How often do you bring products:

a. Daily b. Every other day c. Weekly d. Monthly e. Other:_____

5. How do you pay for products you buy? a. Cash b. Loan c.Other_____

6. Do you sell products to clients on credit? a. Yes b. No

7. What kind of fruits/vegetables do you sell the most? _____

How much fruits and vegetables do you buy for selling on your push cart per week?

Fruits	Frequency of fruits bought per week	Average Value per unit ($ or LL)
1.		
2.		
3.		
4.		
5.		

Vegetables	Frequency of Veg. bought per week	Average Value per unit ($ or LL)
1.		
2.		
3.		
4.		
5.		

8. Would you like an earmarked market to organize your work in relation to the other vendors?

a. No b. Yes. Would you prefer it inside the neighborhood or on its peripheries? _____

II. HARDSHIPS

9. How do you manage in harder weather conditions? (rain for example)

_____

10. Do you own your cart?

a. Yes, How did you pay for it?_____ b. No, who owns it?_____

III. INTEREST IN AGRICULTURE

11. Do you sell all your products? a. Yes b. No

12. What do you do with perished/unsold products?

b.Throw. Where? _____ b. Leave for the 2nd day c. Donate, to whom?_____

d.Other_____

13. Have you ever recycled or reused any of the products you use?

a. No b. Yes. What? _____How? _____

14. Have you ever planted before?

b. No b. Yes. Where? _____What?_____

15. Do you grow any edible plants at home?

c. No b. Yes. Where? _____What?_____

16. What kind of fruits and vegetables do you consume the most at home?_____

Fruits/Vegetables	Frequency of consumption per week	Average value of purchased item ($ or LL)
1.		
2.		
3.		
4.		
5.		

17. How much on average do you pay per week for fruits and vegetables for your personal home consumption? *(include number of persons living in the same home)* _____

18. From where do you get the fruits and vegetables for your own consumption?

a. From your own purchase b. From others,_____ c. _____

19. Do you have any interest in planting fruits and vegetables?

a. Yes, for home consumption or for selling b. No, why? _____

c. What is the incentive to do so?_____

d. Who do you think might be interested in planting? _____

Why? _____

20. If you were given the opportunity to grow your own fruits and vegetables in Nabaa in order to sell them and/or for your own home consumption, would you be interested?

b. Yes b. No. Why? _____

21. Do you think it is a feasible idea?

a. Yes. Why? _____
Where?:
__ Roofs, __Balconies , __Leftover land, __Streets, __Walls, Other____

b. No. Why? _____

22. What is your perception of vegetables and/or fruits grown on roofs, leftover land, balconies? _____
_____

23. What resources do you think you need (space for growing, place for storage, place for selling, resources, water, etc…) _____

24. Do you know of any planting practices currently happening through personal initiatives or NGO's? Such as greening, roof planting, etc….?

a. No. b. Yes, Where? _____Who?_____

Questionnaire 3: Passersby & Dwellers

I. PROFILE:

1. Current residence: Nabaa, since_____

Do you come here frequently? a. Yes, Since_____ b. No._____

2. Why do you choose this as a place to shop/live? _____

II. LANDMARKS IN NABAA:

3. Can you describe main landmarks in which you orient yourself or give directions to others when you describe the neighborhood? _____

4. What's an acceptable walking distance for you? *(in minutes or kilometers)*_____

5. Are there places in the neighborhood that you try to avoid and why?

_____

III. NECESSARY & OPTIONAL ACTIVITIES:

6. Can you identify the places you visit most in this neighborhood? What for? Who's responsible for them? Who else uses them? _____

_____

7. Where do you go for your activities (inside or outside Nabaa)? How do you commute?

a. Shopping? _____

b. School? _____

c. Entertainment with family/ kids/ friends? _____

Do you go to open spaces in Nabaa? A. Yes b. No

*Do you think there are enough open spaces in Nabaa or is there a need for more?*_____

d. Other necessary activities? _____

8. Is there a place you regularly visit in Beirut or in the surroundings or in Lebanon that you really like? Describe the characteristics:

_____

IV. EXPERIENCE OF THE STREET:

9. Do you buy from street vendors or storekeepers?

× No, Why?_____

× Yes.

10. Do you think there should be more products and/or food choices? a. No b. Yes.

What? _____

11. Would you prefer an earmarked market? Inside or on the edge of the neighborhood?

_____

12. What do you think about the newly painted walls and planted trees in Nabaa?

a. Good b. Bad c.Useless d.Other _____

13. Who do you think is responsible of intervening on the upgrading of the neighborhood?

_____

III. INTEREST IN AGRICULTURE

14. From where do you get your fruits and vegetables for your own consumption?

_____

15. What kind of fruits and vegetable do you consume the most?

_____

Fruits/Vegetables	Frequency of consumption per week	Average value of purchased item ($ or LL)
1.		
2.		
3.		
4.		
5.		

16. How much do you pay per week for fruits and vegetables? _____

17. What do you do with perished organic products at home?

a. Throw. Where? _____ b. Donate, to whom?_____ c. Other_____

18. Have you ever recycled or reused or any of the products you use at home?

b. No b. Yes. What? _____How? _____

19. Have you ever planted before?

c. No b. Yes. Where?_____What?_____

20. Do you grow any edible plants at home?

d. No b. Yes. Where? _____What?_____

21. Do you have any interest in planting fruits and vegetables?

b. Yes, for home consumption or for selling b. No, why?

e. What is the incentive to do so?_____

f. Who do you think might be interested in planting? _____

Why? _____

22. If you were given the opportunity to grow your own fruits and vegetables in Nabaa in order to sell them and/or for your own home consumption, would you be interested?

c. Yes b. No. Why? _____

23. Do you think it is a feasible idea?

a. Yes. Why? _____

Where?

__ Roofs, __Balconies , __Leftover land, __Streets, __Walls, Other_____

b. No. Why? _____

24. What is your perception of vegetables and/or fruits grown on roofs, leftover land, balconies? _____

25. What resources do you think you need (space for growing, place for storage, place for selling, resources, water, etc…)

_____

26. Do you know of any planting practices currently happening through personal initiatives or NGO's? Such as greening, roof planting, etc….?

a. No. b. Yes, Where? _____Who?_____

APPENDIX II

FRUIT AND VEGETABLE LIST SUITABLE FOR PLANTING IN NABAA AND ITS PERIPHERIES

	Type	Common Name	Scientific Name	Arabic Name
1	Vegetable	Lettuce	*Lactuca sativa*	خس
2	Vegetable	Cabbage	*Brassica oleracea*	ملفوف
3	Vegetable	Cauliflower	*Brassica oleracea*	قرنبيط
4	Vegetable	Tomato	*Solanum hycopersicum*	طماطم
5	Vegetable	Cherry tomato	*Solanum lycopersicum var. cerasiforme*	طماطم الكرز
6	Vegetable	Cucumber	*Cucumis sativus*	خيار
7	Vegetable	Eggplant	*Solanum melongena*	باذنجان
8	Vegetable	Chilli pepper	*Capsicum annuum*	الفلفل الحار
9	Vegetable	Pepper	*Capsicum x*	فليفلة
10	Vegetable	Green beans	*Vigna*	لوبيا خضرة
11	Vegetable	Beans	*Phaseolus vulgaris*	فاصوليا
12	Vegetable	Chickpea	*Cicer arietinum*	حمص
13	Vegetable	Peas	*Pisum sativum*	البازلاء
14	Vegetable	Broad bean	*Vicia faba*	فول
15	Vegetable	Pumpkin	*Cucurbita maxima*	القرع أو اليقطين
16	Vegetable	Carrots	*Daucus carota*	جزر
17	Herbs	Basil	*Ocimum basilicum*	حبق
18	Herbs	Parsley	*Petroselinum crispum*	بقدونس
19	Herbs	Cilantro, Coriander	*Coriandrum sativum*	كزبرة
20	Herbs	Dill	*Anethum graveolens*	شبت
21	Herbs	Thyme	*Thymus vulgaris*	زعتر
22	Herbs	Tarragon	*Artemisia dracunculus*	طرخون
23	Herbs	Rocca (Arugula)	*Eruca sativa*	
24	Herbs	Mint	*Mentha longifolia*	نعناع
25	Vegetable	Lemon balm	*Melissa officinalis*	ريحان الليمون
26	Vegetable	Sorrel	*Rumex acetosa*	حميض
27	Vegetable	Squash	*marrow*	قرع
28	Vegetable	Zucchini	*Cucurbita pepo*	كوسا
29	Vegetable	Spinach	*Spinacia oleracea*	سبانخ

30	Vegetable	Swiss chard	*Beta vulgaris subsp. cicla*	سلق
31	Vegetable	Artichoke	*Cynara scolymus*	خرشوف
32	Vegetable	Garlic	*Allium sativum*	توم
33	Vegetable	Endive	*Cichorium endivia*	أنديف
34	Vegetable	Onion	*Allium cepa*	بصل
35	Vegetable	Green onion (Scallion)	*Allium wakegi*	بصل أخضر
36	Vegetable	Potato	*Solanum tuberosum*	بطاطس
37	Vegetable	Sweet potato	*Ipomoea batatas*	بطاطا حلوة
38	Vegetable	Kohlrabi	*Brassica oleracea*	كرنب ساقي
39	Vegetable	White turnip	*Brassica rapa subsp. rapa*	لفت
40	Vegetable	Brocoli	*Brassica oleracea var. italica*	القرنبيط
41	Vegetable	Radish	*Raphanus sativus*	فجل
42	Vegetable	Beetroot	*Beta vulgaris*	الشمندر
43	Fruit	Grapes	*Vitis vinifera*	عنب
44	Fruit	Lemon	*Citrus limonum*	ليمون
45	Fruit	Sweet orange	*Citrus sinensis*	برتقال
46	Fruit	Bitter orange	*Citrus aurantium*	
47	Fruit	Avocado	*Persea americana*	أفوكادو
48	Fruit	Pistacia	*Pistacia palestina*	
49	Fruit	Mango	*Mangifera indica*	منجا
50	Fruit	Olive	*Olea europaea*	زيتون
51	Fruit	Melon	*Cucumis melo*	شمام
52	Fruit	Watermelon	*Citrullus lanatus*	بطيخ
53	Fruit	Banana	*Musa × paradisiaca*	موز
54	Fruit	Mulberry	*Morus alba*	توت
55	Fruit	Blackberry	*Rubus fruticosus*	توت عليق
56	Fruit	Fig	*Ficus carica*	تين
57	Fruit	Carob	*Ceratonia siliqua*	خروب
58	Fruit	Pomegranate	*Punica granatum*	رمان
59	Fruit	Date palm	*Phoenix dactylifera*	تمر
60	Fruit	Kaki	*Diospyros kaki*	خرما
61	Fruit	Loquat	*Eriobotrya japonica*	أكي دنيا
62	Fruit	Opuntia	*Opuntia sp.*	صبايير
63	Fruit	Sugar apple	*Annona squamosa*	قشطة
64	Fruit	Strawberry	*Fragaria × ananassa*	فراولة
65	Edible ornamental	Rosemary	*Rosmarinus officinalis*	إكليل الجبل
66	Edible ornamental	Lemon grass	*Cymbopogon citratus*	عشب الليمون
67	Edible ornamental	Geranium	*Pelargonium x hortorum*	إبرة الراعي

68	Edible ornamental	Kumquat	*Citrus japonica*	برتقال ذهبي
69	Edible ornamental	Myrtle	*Myrtus communis*	الحمبلاس - الآس الشائع
70	Edible ornamental	Hibiscus	*Hibiscus rosa-sinensis*	كركديه

APPENDIX III

REQUIREMENTS FOR SELECTED FRUITS AND VEGETABLES

Type	Sub type	Common Name	Scientific Name	Arabic Name	Cropping life	Input	Approximate wholesale average price in season (L.L)	Approximate Retail average price in season (L.L)	Sun requirements and tolerance	Average Crop (Kg/plant)	High yield (Kg/m^2)	Approximate Plant density (Plants/ m2)	Sow to Harvest (Weeks)
Vegetable	Half Hardy Annual	Lettuce	*Lactuca sativa*	خس	-	Medium	759	1050	Full	0.3	3.3	13	8 - 14
Vegetable	Annual	Cabbage	*Brassica oleracea*	ملفوف	Biennial	Medium	419	580	Partial	1	8.2	8	20 - 35
Vegetable	Half Hardy Annual	Cauliflower	*Brassica oleracea*	قرنبيط	Biennial	High	694	1014	Partial	0.8	2.2	2.75	18 - 24
Vegetable	Annual	Tomato	*Solanum hycopersicum*	طماطم	Perennial	Medium	932	1136	Partial	3.5	14	4	12 - 15
Vegetable	Half Hardy Annual	Cucumber	*Cucumis sativus*	خيار	-	High	1081	1475	Full	3.6	5	1.3	10 - 14
Vegetable	Half Hardy Annual	Pepper	*Capsicum x*	فليفلة	-	Medium	1438	1931	Partial	0.7	2.1	3	20 - 28
Vegetable	Half Hardy Annual	Beans	*Phaseolus vulgaris*	فاصوليا	-	Low	4066	4901	Full	1.5	9.2	6.1	10 - 12

Vegetable	Hardy Annual	Peas	*Pisum sativum*	البازلاء	-	Medium	2354	2833	Partial	0.3	8.3	30	11 - 14
Vegetable	Hardy Annual	Broad bean	*Vicia faba*	فول	-	Medium	1661	2134	Full	0.4	2.1	5.3	13 - 17
Vegetable	Annual	Carrots	*Daucus carota*	جزر	Biennial	Medium	826	1127	Partial	0.2	15	75	14 - 18
Vegetable	Hardy Annual	Spinach	*Spinacia oleracea*	سبانخ	-	Medium	1091	1559	Full	0.8	2.2	2.8	6 - 8
Vegetable	Hardy Perennial	Artichoke	*Cynara scolymus*	خرشوف	5 years	Low	653	903	Partial	2.5	2.1	0.8	2 - 3 years
Vegetable	Annual	Onion	*Allium cepa*	بصل	Biennial	Medium	594	888	Full	0.1	2.1	20	14 - 23
Vegetable	Half Hardy Annual	Potato	*Solanum tuberosum*	بطاطس	-	Medium	616	924	Partial	7	30.8	4	17 - 22
Vegetable	Hardy Biennial	White turnip	*Brassica rapa subsp. rapa*	لفت	-	Low	493	771	Partial	0.3	13.3	44	10 - 12
Vegetable	Hardy Annual	Radish	*Raphanus sativus*	فجل	-	Low	528	721	Full	0.1	6.7	67	3 - 6
Vegetable	Half Hardy Annual	Beetroot	*Beta vulgaris*	الشمندر	Biennial	Medium	605	946	Partial	0.1	8.3	80	8 - 10
Fruit	Vine	Grapes	*Vitis vinifera*	عنب	300 years	Medium	2101	2722	Partial	3.5	2	0.6	3 years
Fruit	Half Hardy Annual	Melon	*Cucumis melo*	شمام	-	High	1940	2636	Full	8.9	5.6	0.6	16 -18
Fruit	Tree	Fig	*Ficus carica*	تين	500 years	Medium	3000	3500	Partial	6	0.2	0.03	4 - 7 years
Fruit	Hardy Perennial	Strawberry	*Fragaria × an anassa*	فراولة	3 years	Medium	3150	3940	Full	0.3	0.7	2.3	26 - 40

The “Type” column lists the growing characteristics of the listed crop:

- Annual crops must be re-sown every year from seed.
- Biennial crops are sown in one season and might crop for one or two seasons.
- Perennials grow for a number of years, cropping each successive season.

N.B: Some annuals are biennials or perennials, i.e. they are grown for one year from propagated plants to increase yield.

The “Input” column informs about the amount of work required to grow the crop.
Yield is the average crop per area.

Approximate wholesale and retail price list was retrieved from the ministry of agriculture.

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