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Swedish University of Agricultural Sciences

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A case study of the proposed Culture Casbah development in Rosengård, Malmö.

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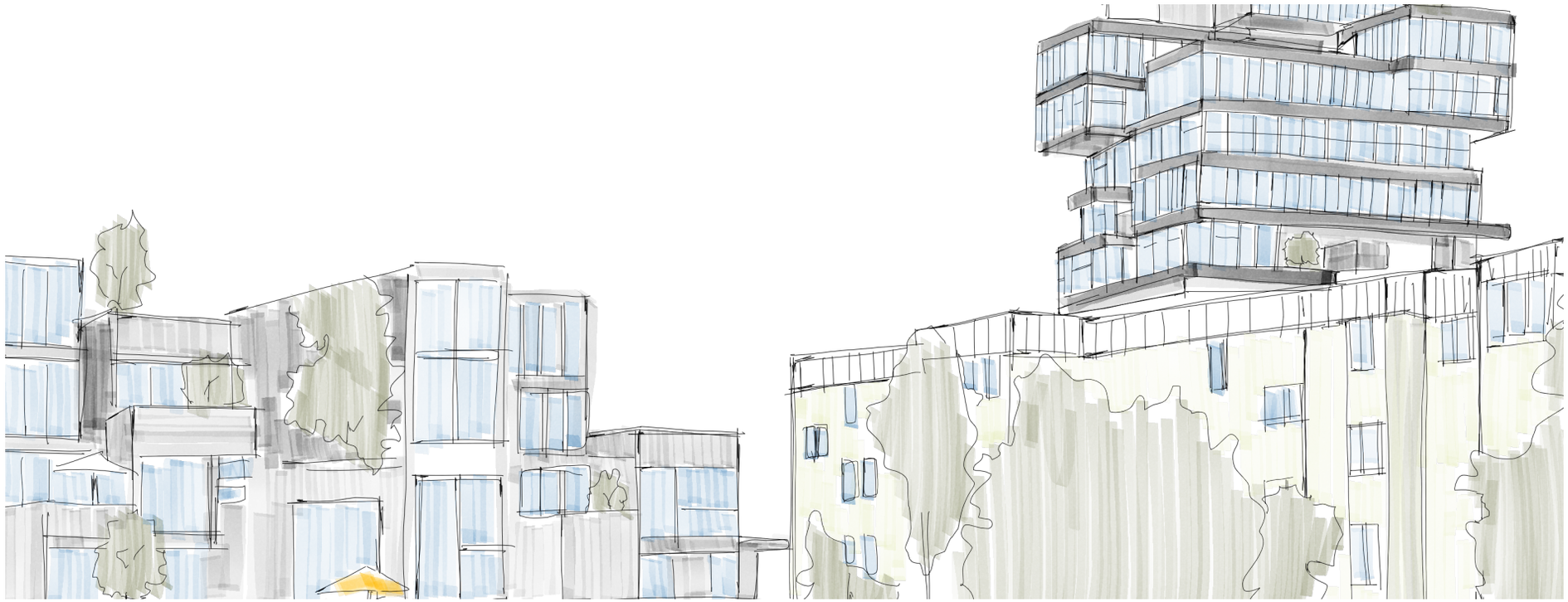

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Assessing the potential for vertical urban agriculture for multi-storey buildings.
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ABSTRACT

This thesis proposes the use of urban agriculture as a tool to address three global challenges related to population growth in cities; densification, climate change and health risk by studying the history and benefits of urban agriculture, it is possible to understand the benefits in better integrating urban agriculture into new urban infrastructure, particularly in high-density housing areas. These benefits include; better living conditions, reduced food transportation, stormwater management and strong links between communities.

The concept of urban agriculture in green infrastructure was tested with a case study of the proposed Törnrosen development in Rosengård, Malmö, to give a specific context to the theory, in which were used global examples of innovative urban agriculture projects for inspiration, alongside details of the current possibilities of urban green infrastructure technology and analysis of the study area and creative design solutions are developed to find out what is possible.

The project finds that when green infrastructure is integrated into the Törnrosen tower, additional benefits to the residents and broader a community is likely to increase, if it is adapted to support urban agriculture, and alongside other urban agriculture community projects in the neighbourhood to have a more significant impact on the quality of life in Rosengård. The use of specific urban agriculture infrastructure will depend on location, type of users, the intention of the garden and stakeholders involved in the gardens. The design principals made to design and evaluate the community gardens could be used for other projects with similarities in the future.

KEYWORDS: *Urban Agriculture, Well-being, Sustainable Development, Urban ecological infrastructure, Food Security, densification, Urban ecology infrastructure, community gardens.*

CONTENTS

LIST OF FIGURES

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SECTION I

1.0 INTRODUCTION

This master thesis is a research study about the benefits that could establish urban agriculture in Malmö's buildings and how to integrate conventional farming model into multi-story housing or multifunction buildings, focusing on three common global problems; populations growth, climate change and health risk (wellbeing) in urban environments, (UN-HABITAT, 2016). For these and other challenges, urban planners, landscape architect, municipalities and stakeholders have the responsibility to provide efficient and sustainable ways to satisfy the inhabitant's needs in urban settlements, with the implementation of services, infrastructure, housing and among other developments that could help in improving the cities in the upcoming decades.

The main reason to centre the master thesis on urban agriculture was the versatility of it, solving problems like those previously mentioned; greenhouses are great examples for addressing food security in urban environments. Researchers are aware of rising issues in cities and nowadays it is popular research topic for them due to the fast-increasing problems (UN-HABITAT, 2016), yet finding a simple solution to solve or eradicate the issues, it is not simple, due to the impact on the environment e.g. greenhouse gases (GHG), pollution, or segregation, plus many more, nevertheless, urban agriculture has positive feedback on reducing many of these problems and many communities around the globe including Sweden are recovering this former tradition, (Kulak, Graves, and Chatterton, 2012). The study is divided into five sections; the first section was the introduction with a focus on the problem and background of urban agriculture. The second section covers a literature review about urban agriculture, making emphasis on climate change, wellbeing and population growth. The third section is was about the analysing the community gardens in Rosengård and the case study of the winner proposal, named "Culture Casbah", designed by the architectural firm Lundgaard and Tranberg for the international design competition (MKB Fastighets AB, 2011) in the district of Rosengård in Malmö and hosted by MKB, which is one of the largest council-owned housing companies in Sweden and the largest property owner in Malmö. This company has a vital role in the master plan project because it is own by Malmö's municipality, and it is also the owner of many of the housing developments in the district. The section number four is the design framework and creative section were theories concepts were tested on the Culture Casbah and finally the section fifth is the conclusion which gathers all the knowledge learnt on the research and design sections, includes the reflexions and conclusions of all the sections.

The key parts of this study is to gather the most essential features for thriving community gardens and propose their integration into Törnrosen Tower with the aim of improving the high-rise buildings and fulfil the needs of the inhabitants of the Culture Casbah in Rosengård as well as the people who will visit the district hoping that this study could be used to improve other buildings in the future. The Culture Casbah is result of the analysis and adaptation plan for Rosengård by MKB and Gehl Architects ApS (2011), which suggest to linked efficiently the neighbourhoods to the rest of the city erasing borders and to increase services, housing and other type of infrastructure that fulfil the requirements of the residents in the area and in other adjacent districts. The need for housing in Malmö is growing and solving this; urban strategy plans are necessary to provide better-integrated housing with a more resilient neighbourhood aiming to more organised densification of the city, especially the district of Rosengård (Commission for a Socially Sustainable Malmö, 2013). Rosengård is a multi-cultural district, a mixture of cultures with many different traditions, and food, that makes it a special place to live, however, it is also a challenging problem to solve due to the indices in crime and violence. The densification of Rosengård has been identified as a great opportunity to reinforce the multi-cultural identity and connect it to the rest of the city and reduce insecurity.(MKB, and Gehl Architects ApS, 2011). The case of Rosengård in Malmö can be seen globally, and many of the design solutions found in this research came from global examples, which means that it could be possible to apply on other cities with similar problems as the ones Malmö is now facing. Culture Casbah is an immense opportunity to open the debate and reflect on what could be the future of sustainable cities.

1.1 BACKGROUND DESCRIPTION

"Global Goals for Sustainable Development" by the UN has inspired Scandinavian cities to adopt procedures for better solutions and measures to densify cities in a better way to encounter and mitigate Climate Change. Malmö authorities have taken these strategic goals, and now it has become part of the agenda of the Climate adaptation strategy (Malmö city planning office, 2018), in which it is established that Malmö has the intention of being a global leader by 2020 in terms of sustainability. The increasing interest in adopting new strategies had been triggered by the urban problems mentioned before and among others. It is starting with population growth which is the source for most of the current difficulties in cities which has an impact on and is significant in divers' fields of study due to the effect it is causing on the urban environments around the globe.This rising population it is also attributed to the increasing number of people migrating to cities nationally and internationally for economic reason and also migrating from countries affected by conflicts, which contributes to transforming the city's landscape, culture, and economy. In 2018 the population in Malmö reached almost 340,000 inhabitants, which are gradually increasing partly due to migration (Malmö Stad, 2019a) but also because of the strategic location in the city and the Öresunds region. Studies have projected to increase the population double in the upcoming ten years in most of the cities around the globe (UN-HABITAT, 2016).

Malmö is home to 175 nationalities, making it one of the most diverse cities in Scandinavia (UN-HABITAT, 2015a). Countries like Germany, Austria and Sweden have been receiving large numbers of refugees (UN-HABITAT, 2014), assuming responsibility in the European Union of providing better conditions for those who have been forced to leave their counties. Some of those responsibilities are presented by the UN in their 17 goals to achieve sustainable developments. Those goals such as good health and well-being, quality education, gender equality, sustainable cities and communities, and reduced inequalities are some of the examples related to what the municipality, stakeholders and planners are focusing on addressing with the Culture Casbah proposal in Rosengård.In 2050, 68% of the population will be living in cities. With this growth in society, the authorities are expected to provide enough services and urban ecological infrastructure in which people can live, work, commute, shop and spend their free time in a more sustainable way (UN-HABITAT, 2015b).

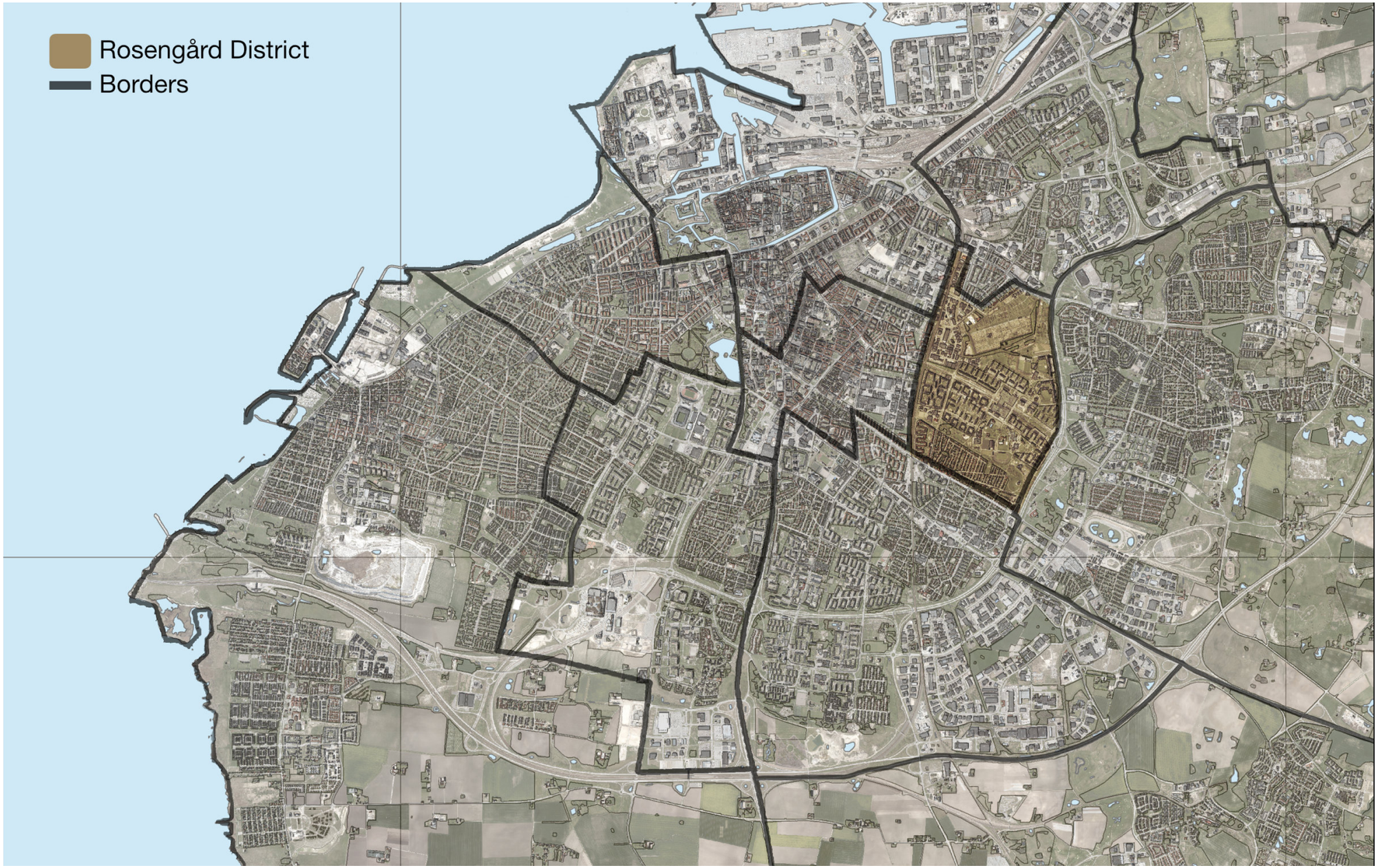
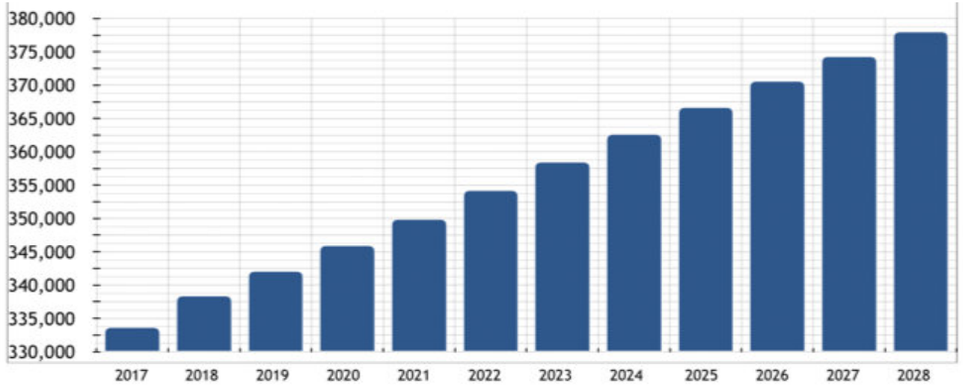


Figure (1.0) Map of the city of Malmö showing the boarders of the districts including Rosenegård.

Today, cities around the world occupied 3% of land use, which be seen as an insignificant percentage to many (Lucas, 2019), yet, the world is covered with unlivable areas, water bodies and other surfaces, even thought the use of advanced technology, it has been complicated to settle them for decent living conditions, due to the complexity the weather conditions, economy or accessibility.



Cities around the globe gather 55% of the world's population. In Sweden and other countries around the world, population have been growing rapidly in the past years (UN-HABITAT, 2016) which is essential to analyse due to most of these cities like in Sweden;

Figure (1.1) Chart of Malmö's population growth expectations from 2017 to 2028. Data from Malmö Stad (2019c)

Stockholm, Gothenburg and Malmö (Rosado, Kalmykova & Patrício, 2016) represent a large number of employment opportunities, economy, politics and innovation. Although the location of Rosengård in the Öresund region has great potential to benefit the district and the neighbourhoods, there is an important task to favour the bond between communities and the rest of the city, which does not exist today according to (MKB, and Gehl Architects ApS. 2011), due to the existing industrial areas, infrastructure, limited transportation systems and physical barriers such as walls dividing pedestrian under passages.

Studies have shown that cities provide better conditions for many people coming from other countries or from the countryside where the job opportunities are limited. Better services, numerous chances of employment, parks, shops and transportation are some of the features that can be found on urban settlements. Yet, in some cases like the study conducted in 2008 in the district of Rosengård by Oudin, Richter, Taj Tahir & Jakobsson (2016), found overcrowded housing units in Herrgården with inadequate living conditions which resulted in a negative effect in which many people living in the area were affected. It is life-changing to start a more balanced lifestyle in terms of economy, health and education and the benefits could be even more significant for those moving from other countries due to political, economic or even war conflicts. Today many urban settlements are constantly working against the clock to find solutions in which planners, landscape architects and other stakeholders are involved in making better planning programs and strategies to solve problems facing the urban settlements.

1.2 RESEARCH QUESTIONS

Elaborating on the claim that in the next decade it will be more popular to see more high buildings in Scandinavia, the first question that led the rest of the study was:

- Can community gardens be integrated into new grey infrastructure? Specifically, new housing developments privately or public owned from the standard height of ten storeys.

In the early stage to clarify the topic for this master thesis, two more questions lead to the environmental strategies in the city of Malmö.

- What is going to be the future of urban agriculture? In Sweden but specifically in Malmö
- How can the city of Malmö can be more environmentally and sustainably prepared in terms of local food production efficiency?

Those two questions were important to start focusing on Rosengård due to the ambitious plans to improve the neighbourhoods of Törnrosen and Örtagården, also with the objective of increasing the number of houses. Finally, to land the topic for this master thesis, a case study is formulated from the three questions:

- Assessing the potential for vertical urban agriculture for multi-storey residential buildings: A case study of the proposed Culture Casbah development in Rosengård, Malmö.

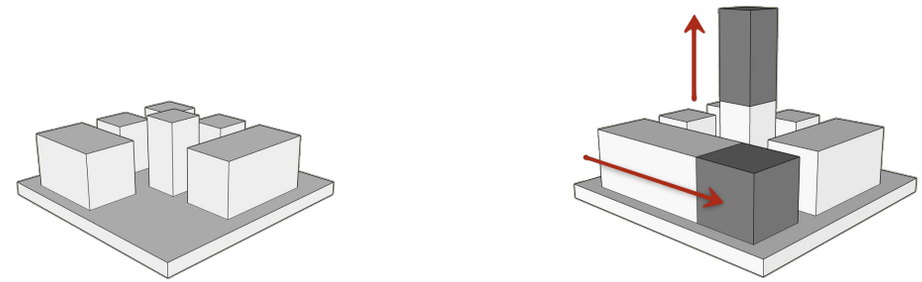


Figure (1.2) Image of how cities expansion occurs, in horizontal and vertical direction.

1.3 AIMS AND OBJECTIVES

The aims of this Master Thesis are:

- To clarify the benefits and challenges of urban agriculture communities in high rise buildings.
- To analyse the design proposal Culture Casbah in Törnrosen and Örtagården neighbourhoods by the architectural firm Lundgaard and Tranberg to identify possible areas for community gardens.
- To create a toolbox that could be used on the tower to improve the public green areas.

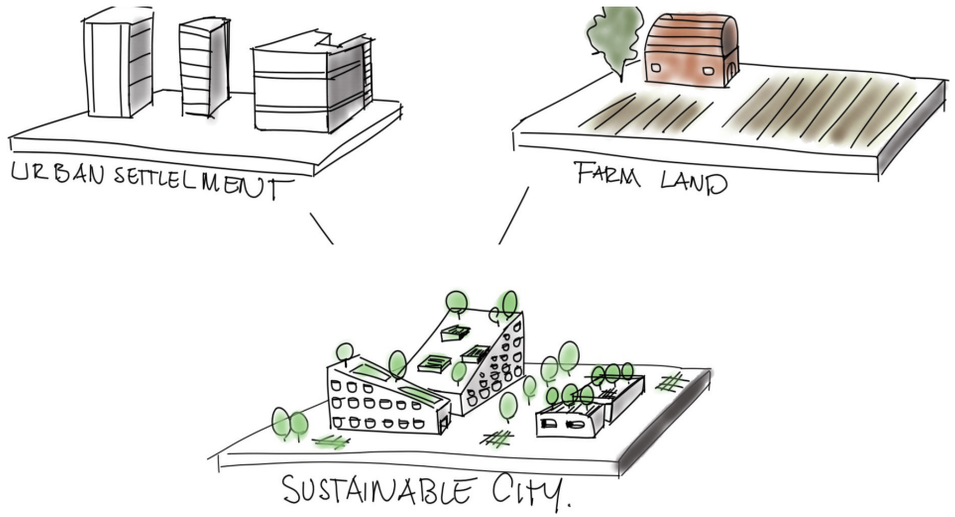


Figure (1.3) Diagram representing the aim of integrating urban settlement and farmland that ends on a sustainable city.

1.4 THE STATE OF THE PROBLEM

Urban settlements around the world present different issues and each of them affects in various ways a population, depending on the context (HABITAT, 2014). The main challenges to work within this thesis are closely related to each other and present in urban settlements' around the world as well as in Malmö (Malmö, 2017). However, a large number of problems affecting cities are complicated to study at the time due to the complexity of each of them. For that reason, the study was focused on three problems that were most related to the urban agriculture theme and more specifically the district of Rosengard's: Population growth and the associated densification of cities, extreme weather conditions due to climate change and health risk of an urban environment. However, the population growth in cities is the trigger for most of the city problems around the world. The most significant examples of challenges in the cities are:

- Rapid unplanned urbanisation
- Lack or deficiency of services (transportation, infrastructure) and public spaces.
- Gentrification
- Exclusion and rising inequality in the population
- Insecurity
- National and migration
- Climate change (greenhouse gases, heat waves, flooding, extreme temperature (UN-HABITAT, 2016).

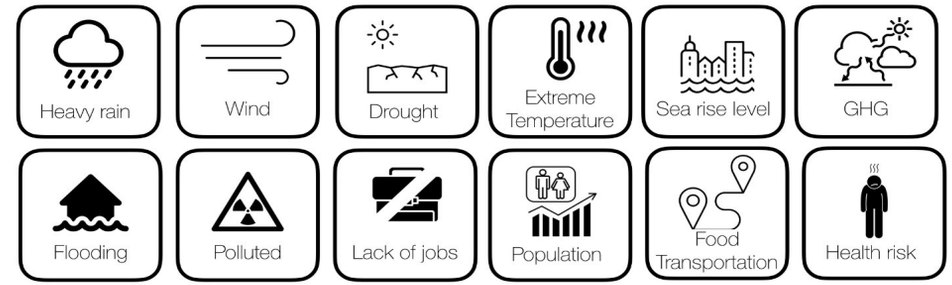


Figure (1.4) Diagram of some of the most popular problems in urban settlements.

1.4.1 POPULATION GROWTH CHALLENGES

The problem does not remain just on urbanisation, but in which location in the city grows, how fast or even how high the buildings will be (Li, Liu, Zhang, Zhao, Liu, Zhou, and Wang, 2017). Studies have been shown the importance of preserving agricultural land in and it is the same for the case of Skåne due to the quality of soil in the region is more valuable to perserve it. For the case of the city of Malmö, it is notable that the growth of the city tends to be inwards, and the challenges are more significant in that situation in terms of energy efficiency for example food transportation, there could be a significant benefit using the concept of "compact cities", but in terms of green spaces, it might be more complicated to deal with it. Using all the possible resources, such as strategic, comprehensive and other study plans in combination with stakeholder engagement, could be the way to solve these and future problems in the urban settlements. Living in high buildings is becoming a trend in most densely cities around the world and studies had suggested the importance of reconnecting with nature (UN-HABITAT, 2016). In Cities for people (2010), it is highlighted how these connections between ground levels and the building height dissolve after the fifth floor.

1.4.2 THE CLIMATE CHANGE CHALLENGE

This study is focused on three specific aspects of climate change; increasing heavy rains, warmer weather conditions and droughts. Climate Change was another factor to include on this study, due to the strong influence that represents on the topic and also because of the environmental events happing in Malmö, (Malmö Stad, 2017) However, climate change affects every continent in a different way and in some places could bring even some benefits such as longer growing season or less use of energy during the winter to heat houses. In many cities around the globe it is common to see weather events that have being increasing dramatically mainly caused by climate change, as an example flooding caused by heavy periods of rain and sea level rise, droughts and extreme temperatures causing wildfires or crop-loss, other, affecting cities and the daily life of many people. In the city of Malmö city, recent events have alarmed municipalities to work to prevent a future crisis like the most recent in Skåne the extreme heat and drought, which took place in the summer of 2018. Municipalities in Skåne and other parts of Sweden experienced a period of drought that was not experienced in the last 20 years ago. Authorities issued a statement which prohibited to water lawns and light fires for camping or picnics that could cause wildfires. (Viktoriia Zhuhan,2018).

One of the most notorious indicators of how people will experience climate change is through the impact on food prices and the reduced market offer (The Guardian,2014). The need of food transportation from rural areas to cities contributes to Green House Gases (GHG) (Dubbeling, 2015), also the storage and preservation of food represents a small value but significant value when all the factors are involved. Another problem emerging is related to heavy rain periods and for the city of Malmö is not an exception, some events in the past seven years brought extreme heavy rain days causing damage in city, roads, buildings and electricity supply was affected due to flooding in different areas in the city. During the last decade, Malmö had suffered massive rain events that changed life in different ways. The first one in 2007 with 100 mm rainfall in 24 hours in the eastern Malmö area affecting mainly properties, infrastructure and traffic congregations (Malmö Stad, 2017). The second event in 2010 with 60 mm rainfall for 6 hours affecting central and Western areas in Malmö and finally the third even in 2014 with 130 mm rainfall during 6 hours in central Malmö affecting, properties, blackout in several houses for a few days and some evacuation of properties happened during this event. (Malmö Stad, 2017) "Urban problems such as flooding, air pollution and traffic jams have revealed the weakness of the conventional grey infrastructure", (Li, Liu, Zhang, Zhao, Liu, Zhou & Wang, 2017) and projects like the Culture Casbah have the responsibility to solve these problems. At the same time, the climate adaptation strategy for the city of Malmö is trying to make aware of and prevent disasters in the upcoming year.

1.4.3 WELLBEING AND HEALTH CHALLENGES

Studies had shown problems in the district of Rosengård like poor housing conditions affecting children, and health inequities, (Oudin, Richter, Taj Tahir, & Jakobsson, 2016) and (Commission for a Socially Sustainable Malmö, 2013). Cities are becoming greyer and partly of this is due to the city growth. In search of a better quality of life, people are moving into cities to obtain a better income, better infrastructure and more services close by but with this increase in population the need of proving all those services lead to the use of every square meter to develop each of these needs. Studies have pointed at people living in urban settlements having higher levels of stress and other problems like depression, high blood pressure or diabetes, Soga, Gaston & Yamaura, (2017). Cities in Asia and America suffer from pollution threats in which people are not allowed to carry out physical activities due to the high levels of CO2 in the air (UN-HABITAT, 2016). The fact that cities are becoming higher as they become more densely populated, it is thanks to the innovation on materials and structural systems that allows engineers to design more floors, meaning the residents of the building have fewer chances to connect with nature, (Gehl. 2010), which a number of studies find it necessary to increase wellbeing in the population. (Soga, Gaston & Yamaura, (2017).

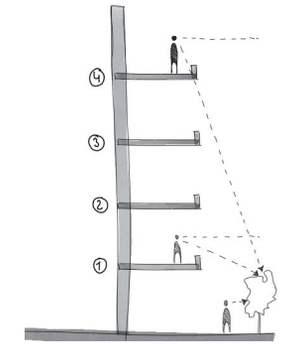


Figure (1.5) Diagram of level of high in a building. Showing the disconnection between people and nature. (Gehl. 2010)

1.5 URBAN AGRICULTURE CHALLENGES

In spite of growing food in the cities has a large variety of positive effects on societies and cities, it could also end affecting them if the practices are not well managed. Problems of inefficient management of urban agriculture could end in a negative impact affecting communities and the environment Li, Liu, Huisingh, Wang & Wang, (2017). One example could be soil erosion, pollution of ground water due to the use of chemical fertilisers. The inadequate use of these tools could end in health risk for the communities in the urban settlements. Some of the urban infrastructures require more infrastructure than others, e.g. indoor solutions must include electricity, water treatment plants, drainage), then for examples raised beds only need the raw materials and the farmers provide all the services:

- Not integrated into urban planning strategies
- Land mitigation
- Pollution in soil, air or water
- Vandalism
- Lack of management on bottom-up initiatives.

1.6 METHODOLOGY

The method used for this master thesis was divided into five sections based on qualitative research and one case study. The study started with section one in which the background was discussed, research question and the state of problem that covers three main challenges; populations growth, climate change, wellbeing and health issues.

Section One; The Introduction is used firstly to place the reader in the context of what is currently happening in cities around the globe in terms of urban problems and urban agriculture to establish the framework of this master thesis. The section covers a local and global analysis of problems that helped to clarify the topic and precisely the research questions. In the local and global scale maps, articles, data and a rare number of recent events affecting the communities and infrastructure around the world and in the city of Malmö were selected. After presenting the background, the research questions are set, to guide the study into the topic of urban agriculture. Following the research questions, three main issues are identified closely and partly related to urban agriculture, and those are; population growth, climate change and wellbeing and health risk of people living in urban environments. These problems are described and explained in detail. Next, the aims were presented by section.

Section two, the literature review, focuses on the urban agriculture theme. Starting from a global scope with the urban ecology infrastructure review to, understand the concept and also to clarify detail areas in the city that can be used for urban agriculture. The history of urban agriculture was focused on recent activities that were important for elder civilisations around the world and how urban agriculture started in Sweden. Then it continues with the definition and different meanings of urban agriculture covering gaps that might be missing due to language barriers or cultural background. The next part corresponds to standard urban agriculture solution, e.g. green walls, roof gardens and indoor farming. Finally, the section concluded with global examples of urban agriculture and other analogues to illustrate the solutions on existing projects.

Section three is a case study of the winning proposal; Culture Casbah, for the international competition based in Rosengård, including a site analysis and study of the existing urban agricultural community gardens in the study area The impression of the area was made to clarify the limits of the case study and also to identify the urban agriculture groups located in the neighbourhood. The public space analysis was made on four visits to the neighbourhoods Törnrosen and Örtagården based on the site selected for the international competition where information about the people, buildings and public space was collected. The following points were studies during the visits:

- Green areas (conditions, amount of areas, quality)
- Infrastructure (public transportation, bike roads or lightning)
- User groups (ages, gender, walking or biking)
- Community gardens (conditions, food growing)
- Accessibility (pedestrian roads and signs)
- Services (stores, restaurants or supermarkets)

The case study was made parallel to section two, in order to make use of the data, map, literature, theories or concepts and place them into the project. The Culture Casbah covers a large area for new developments including the densification project for the two neighbourhoods Törnrosen and Örtagården in which the Törnrosen Tower was studied in detail. A multi-use building with public and private areas, part of the urban plan proposal using tools like sketching, photography, visual surveys, mapping, 2D and 3D visualisations.

Section four was the result of the analysis and data collection, which was applied to the design principles on different solutions to integrate community gardens into the Törnrosen tower. From using maps, visualisations and diagrams of the project, a few key strategies were concluded from the study to be implemented on the 2D drawing and facilitate the analysis of areas in Törnrosen Tower, e.g. balconies, the entrance of the building, roof, walls, or public areas. The result was analysed and compared with the design of Lundgaard and Tranberg proposal to corroborate outcome and evaluate the benefits and challenges of the design Section five gathers the conclusions and reflections, including the suggestions and improvements for the building proposal, using design, or other already existing designs on ground levels, principals to emphasise and clarify the improvement intentions on the Culture Casbah with urban agriculture infrastructure. These design solutions would reflect the knowledge acquired during the development of this master thesis.

The design proposal for the Culture Casbah is still under modifications which makes it difficult to obtain accurate information on specific parts of the building, however the project has a lot of potential to change in benefit of the residents and possibly the section III, case study lacks update information that could impact the design solutions. For future studies it is necessary to analyse in more detail the toolbox make more distinctions on the design solutions to obtain better result on each design proposal.

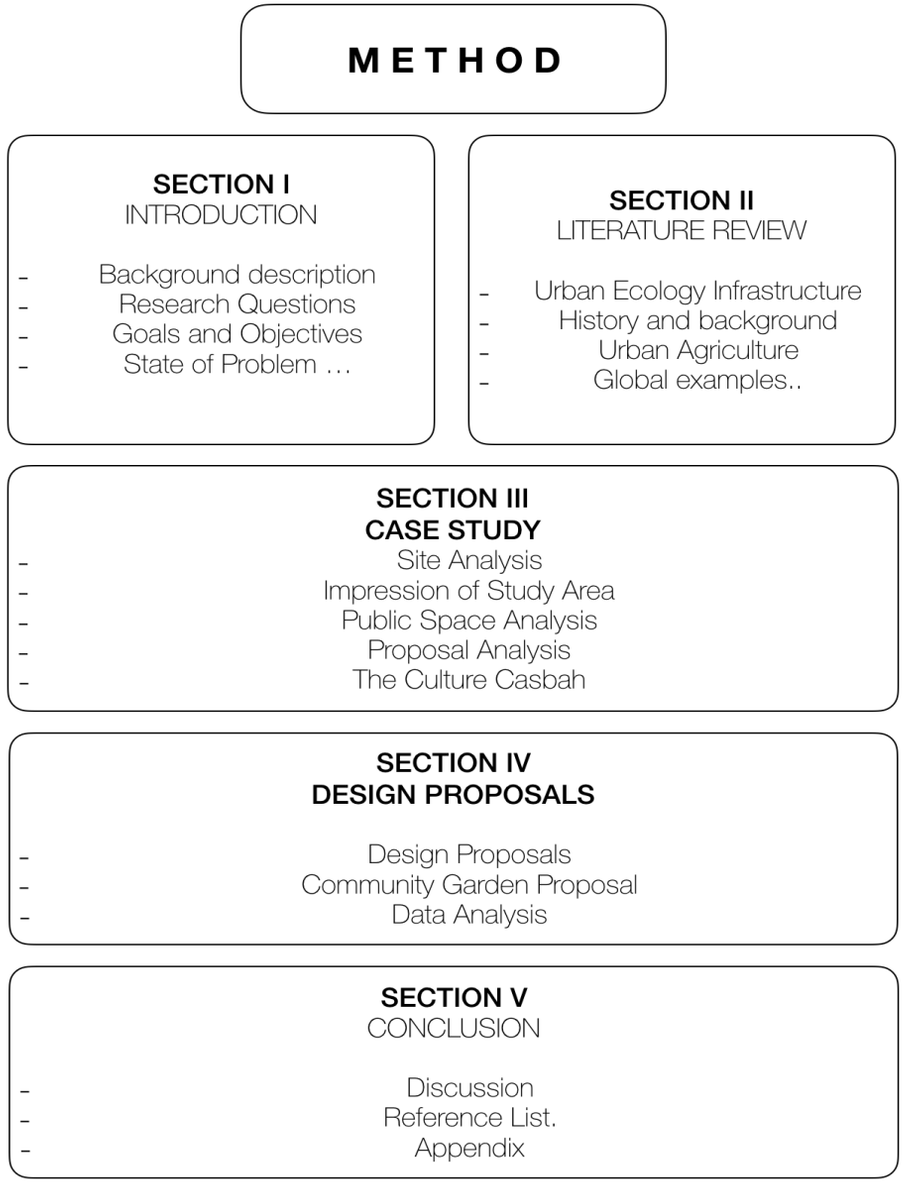


Figure (1.6) Diagram representing the method used for the master thesis.

SECTION II

2.0 LITERATURE REVIEW

The following diagram (Figure 2.0) represents the selection of a theoretical framework for this master thesis to describe the number of subjects involved in the qualitative study and case study of the Culture Casbah. Even though for this master thesis the case study is a combination of different fields, like architecture, landscape, urban planning and engineering, the approach was only focused on landscape architecture field and in some cases, like in section four, supported the study with an architectural approach to guide in making better decisions on the design solutions that required extra knowledge of building design, hydraulic installations, stormwater management and structural systems to get accurate solutions

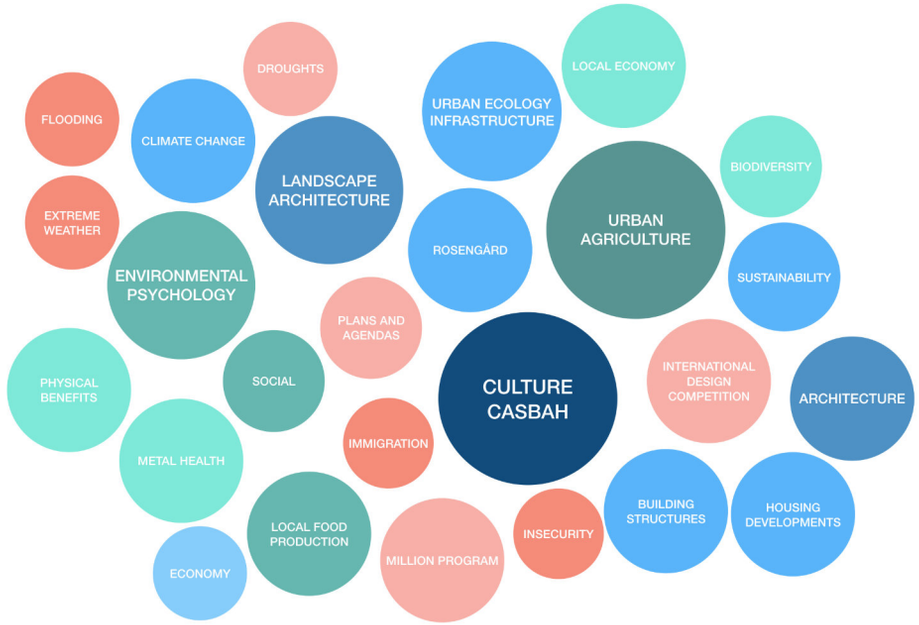


Figure (2.0) Diagram of theoretical framework.

For the whole process, the Landscape Architecture field was the foundation and guideline to create the history line of this work using three approaches from the urban agriculture theme; population growth, climate change and wellbeing. Architecture literature and project analysis methods were included briefly to complement the study and reinforce the design principals in the case study. However, we can also see on the Figure (2.0) that the study is just a small part of the big problem that could be studied in more detail, with different perspectives and subjects in other studies.

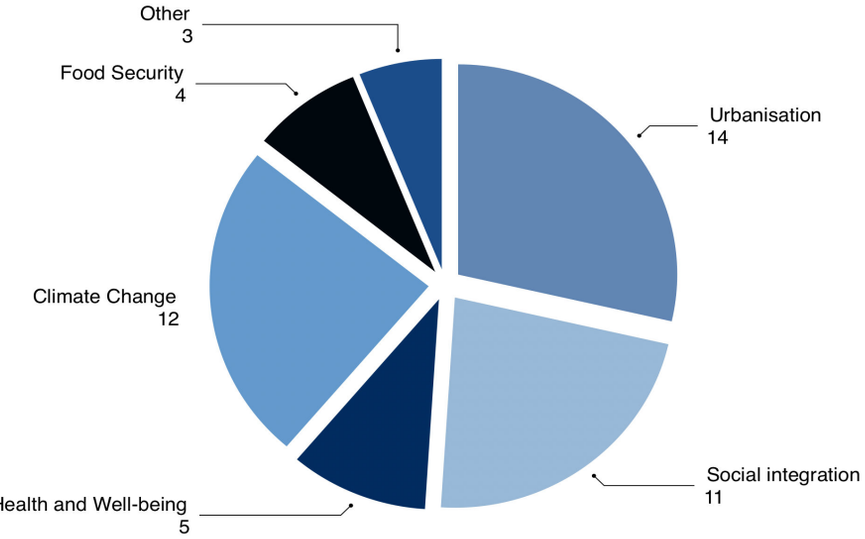


Figure (2.1) Chart representing the appearing problems in the literature review.

During recent years, urban developments in Malmö has been emerging on a large scale. One of the most populars examples of these urban developments is the Turning torso design by the architect Santiago Calatrava, which is today a landmark in the Swedish landscape. It is located on one of the flattest areas in Sweden, Skåne and it could be visible from kilometres away and even from Denmark. The recent workshop from a Danish Architecture firm Henning Larsen set on a round table called "We need to talk about tall building in Scandinavia" (Larsen, 2019) which encourages the debate on skyscrapers coming to Denmark and other Scandinavian countries, this was partly due to the increasing population growth in cities like Copenhagen and Malmö. The debate inspired the listeners to get familiar with high structures for housing, offices or commercial proposes, some examples of the highest buildings in Malmö are the Turning Torso with 57 floors and the Point, Hyllie, with 29 floors. The Culture Casbah is planned to have 20 floors, in relation with the rest of the housing building on the site with nine floors, it is planned to be a landmark in Rosengård district. (Global tall building database of the CTBUH, 2019).

Urban planning projects like the Culture Casbah require a large number of different disciplines, stakeholders, social groups and many other organisations, to be involved in the design process, this is due to all the elements of the master plan and what is needed to do to fulfil people's requirements. There are many factors involved in the city's urbanisation, e.g. transportation, infrastructure, services, and many more elements that create the complex condition to be considered in the city planning. Adding to all of these elements, e.g., new emerging technologies, tools, structural systems, and materials, are allowing us to build higher, faster a more efficiently, which is awaking a concern on the rapid urbanisation expansion (Li, Liu, Huisingh, Wang & Wang, 2017).

To create a reliable design approach and efficient to the communities in Rosengård, it was necessary to study what is happening on-site, to understand the need of the people living in the area and then, choose solutions that could fit the Culture Casbah's design. This section centres on analysing the possibility of learning from the most popular community gardens and also the less popular. Many of these gardens were used as inspirational analogues for the design process, which lately were applied as design solutions on public spaces in the Tönrosen Tower.

The concern of having fewer green areas in cities is increasing (Li, Liu Zhang, Zhao, Liu, Zhou & Wang, 2017) and some articles claim that there is a need to integrate urban agriculture into urban plans and strategies (Egli, Oliver & Tautolo 2016). An article named "The happiness about planting trees in the city", highlights the pressure of reforesting the urban settlements to absorb CO_2 in order to reduce the use of air conditioning in housing and offices (Lucas, 2019). The Incredible Edible Network an urban agriculture community that is expanding all over the world growing food in towns in many different countries with the vision of recovering unused urban spaces for urban agriculture to create closer community and empowering local producers in cities (Incredible edible limited, 2019). Yet, there are many groups around the world have a different approach or use urban agriculture, some groups in Malmö use U.A. for wellbeing, environmental benefits, other groups use it to depend less of imported products, and in a few cases to create job opportunities. The benefits of U.A. agriculture can be more considerable than we think.

The groups, communities and NGO's in Malmö are well known for being actively involved with bottom-up participation programs, and urban agriculture organisations are not an exception. In Rosengård district there are groups working with immigrants and people that have difficulties integrating into Swedish society, (Botildenborg, 2017) This group mainly helps people with seeking jobs using the community garden project as an urban planning tool to teach people a trade to make easy the process of seeking jobs in Malmö, which is the city with the higher numbers of unemployment in Sweden (Commission for a Socially Sustainable Malmö, 2013).

One of the most active organisations in the city of Malmö is Botildenborg which is based in Rosengård, and runs different projects with user groups including children, refugees, immigrants and residents which are guided on agricultural practices to learn about the process, and meanwhile they also grow new communities and more social sustainability through the gardens (Vallance, Perkins & Dixon 2011). As the Botildenborg organisation, many other non-profit organisations have been working on bringing back crops into the cities due to all the side benefits, such as more local producers, healthier communities, and reduction of greenhouse gases by increasing green areas in the neighbourhoods. Studies suggest that U. A. could be a small part of many other actions that could improve the living conditions in urban settlements (Egli, Oliver, & Tautolo, 2016). For some people it could help to find a job (Commission for a Socially Sustainable Malmö, 2013) and with the program "Farmers without borders" urban agriculture offers them a possibility to learn skills or just to start learning the Swedish language by talking to other farmers, helping indirectly to involve them into the society. Currently, it is becoming popular to see the befits of having areas like allotment gardens, community gardens in parks, roofs, or balconies.

The following section the utilisation of the tower helped to create accessible areas where residents of the tower could grow food and have the opportunity to build community gardens and essentially to put on practise the theory and tools of the literature review in oder to adapt conventional farming in public areas of the tower like terraces, balconies, roof gardens using flower beds, greenhouses, or green walls to make more clear the uses of urban agriculture to improve the urban ecology infrastructure and reduce the problems previously mentioned on this section.

2.1 URBAN ECOLOGY INFRASTRUCTURE AND GREEN BUILDINGS

Due to the continued pressure from NGO's and international agendas, countries around the world are starting to adopt the 17 sustainable goals from the (UN-HABITAT, 2016) this is also the case for Malmö municipality who have a sustainable strategy plan to achieve by 2020, which will placed Malmö as a leading example of a sustainable city. In this study the included SDG's are, good health and wellbeing, industry innovation and infrastructure, sustainable cities and communities, climate actions, responsible consumption and zero poverty, the last one was less used due that for the case of Sweden is not a problem, (Malmö City Planning Office, 2018). Many of these goals are related to cities and as a consequence to the Urban Ecology Infrastructure concept which is defined as the planning and management networks for lands, nature base, working and other kinds of open ecosystems spaces with values, and functions that provide benefits to the society. In general, terms means to balance combination between water bodies, greenery and grey infrastructures to enhance the urban fauna and flora by using, for example, green roofs, rain gardens, wetlands and more design solutions in benefit of a more sustainable environment (Li, Liu, Huisingh, Wang & Wang, 2017). On urban settlement contexts, urban agricultural activities fit in the urban ecological infrastructure and for some of the extensive community gardens in Europe areas this model could provide shelter for fauna using diverse elements, appropriate management and variety of flora could be used to enhance the conditions for native species, (Cabral, Keim, Engelmann, Kraemer, Siebert, & Bonn, 2017).

Water bodies or 'blue areas' can be found in different shapes, size and structures. Some of the most common ones in urban settlements are wetlands and rivers which enhance the opportunity for water self-purification, pollution digestion and ecological restoration. These two components, among others, help to increase biodiversity and can also generate a microclimate in the cities. These elements could also be considered as a threat, as with lack of knowledge or mismanagement could affect infrastructure when, for example, heavy rain periods flood urban areas. In general terms wetlands, ponds, rivers, among others are considered natural sponges that enhances the urban biodiversity and keep the cities safe from more significant threats. Using the examples of "Chinampas" or floating gardens in Mexico City (Dieleman, 2017), the water bodies can also be used to have productive areas to grow food. Green land is another fundamental component of urban settlements and essential to be integrated into the Urban ecological infrastructure to improve ecosystem services and improve health and wellbeing in the communities. Green areas are commonly gathering most of the urban agriculture communities in Rosengård, in the shape of allotment gardens, raised beds and green walls. This form of urban agriculture is essential in the green infrastructure of Malmö due to the benefits it brings to the biodiversity and also to the communities. Many of these areas are connected with green corridors, parks, and vacant land.

The last component of the Urban Ecology Infrastructure is the Grey infrastructure, defined as the conventional infrastructure design includes roads, highways, electric grids and system of transportation and treatment of drinking water, sewage and stormwater" (Li, Liu, Huisingh, Wang & Wang, 2017). In a future not far from today, it will be necessary to include in the green infrastructure urban agriculture as part of each comprehensive plan in the municipalities in Malmö. Today the use of grey infrastructure, specifically in terms of pavement, has reached 580,000 km2, approximately the same area as the total Spanish land surface (Li, Liu Zhang, Zhao, Liu, Zhou & Wang, 2017). Building surfaces, roads, ditches, banks, and other impervious pavement, blocks the exchange of air, water, and nutrients through the soil and the atmosphere, thus significantly affecting urban ecosystem services and urban environments. Many sustainable alternatives have appeared during the last decade, permeable pavements, green surfaces, and green roofs are used to mitigate climate change by preventing rainwater run-off, reduce energy for cooling or warming buildings and much more (Dieleman, 2017). Many researchers have questioned the use of these solutions, due to the small benefits that brings to the enviroment, however with several projects running, in a long term period the results could make a significant improvement in the next generations.

2.2 HISTORY AND BACKGROUND OF URBAN AGRICULTURE

Nowadays, designers all over the world have an enormous pressure and responsibility to find solutions for old and also rapidly emerging problems our societies are facing. Many of the problems are becoming greater through generations like population growth, climate change and food security. An example of these is the high levels of CO2 in urban settlements or the frequency of flooding events. However, other problems are challenging to track because they are relatively new or unexpected, like migration or extreme weather events due to climate change. Urban agriculture is one of the solutions that prevailed along with generations in many civilisations, and it is becoming popular again in the young communities and luckily as a popular tool that could be used by planners and stakeholders involved in urban planning.

Research has found that urban agriculture used to be present in the centre of the largest urban settlements, such as the Greek and Roman, also in middle eastern societies where the production had extra values than just providing food to the inhabitants of a city. In some cases had aesthetical and philosophical values. Mexico City conserves until today the traditional food production in "Chinampas" located in the south of the city in the Xochimilco's district that has been an active food producer to the city since the Aztec civilisation between the years 1300 and 1521 (Dieleman, 2017). Residents in Xochimilco used to use the channels for transporting goods and food to the rest city. Today, the floating gardens are part of the metropolitan region of Mexico City, immersed in the urban structure due to the city sprawl. Because of the cultural value, it has preserved the farming heritage from the Aztecs civilisation (Dieleman, 2017), and is a notable example of how to integrate local food production in water bodies in cities.

In many western countries, urban agriculture started to appear on private land but also in cities illegally located in vacant land, corridors, along the railways, parks, and harbours. U.A. was also present in private gardens (Tornaghi, 2014) each community garden independently of being closed or public community, has a different intention, in some cases, the use of them is to provide food security and in other cases to reinforce communities or increase job opportunities. In Sweden, urban agriculture started to establish before 1850 in the form of a land donation by the Swedish Crown. At the end of the 16th century and part of the 17th century, some of the medieval towns in Sweden received land donations to favour agricultural activities, in order to increase their labour forces and economy. Cities including Uppsala, Kalmar, Arboga and towns in Skåne were granted with large areas of land. However, the Crown also had intentions to transform the medieval cities in a more organised city structure with straight street patterns; many researchers found these donations contradictory for the cities formalisation and the intention of being more actively involved in urban agriculture activities. Björklund (2010)

2.3 URBAN AGRICULTURE

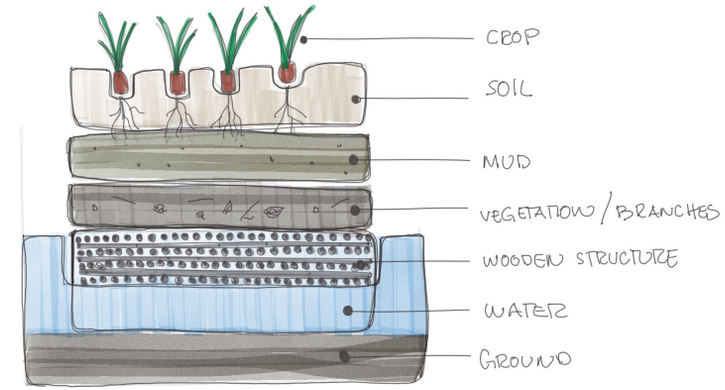


Figure (2.2) Illustration showing the components of a floating garden.

Around the globe, the urban agriculture movement is growing fast, due to the benefits that researchers have found on people's wellbeing, environment, food security and many other benefits related to urban settlements, (Maas, Van Dillen, Verheij & Groenewegen, 2009). Organisations, stakeholders and NGO's have funded an international network which supports global urban agriculture in many different ways, e.g. research, events and conventions, to increase the awareness of growing food in towns. The RUAF Foundation (Resource Centre of Urban Agriculture and Forestry) in partnership with NGO's institutions and worldwide organisations is intimately involved in all the actives related to food production in towns. It defines U.A. as “the growing of plants and the raising of the animal within and around cities” (RUAF, 2019). In general terms, Urban Agriculture refers to the practice of food production, and animal husbandry in urban and peri-urban areas and includes vertical farming, roof garden and ground solutions. It also consists of the distribution of products. Urban agriculture is present in cities in different ways; small such as growing in balconies or big-farms like growing in vacant land, food production on housing estates, community gardens, vertical walls, terraces, rooftops gardens, beehives, greenhouse, salad gardens, public spaces, terraces, allotments, balconies, vacant land, ponds, canals, and many more (Tornaghi, 2014). While conventional agriculture is based on large areas of land to produce a large amount of food, urban agriculture is limited to the available city spaces, e.g. in parks, corridors, roofs, walls and vacant land and it tends

to be organic due to environmental policies that restrict the use of pesticides or chemical in cities. Urban agriculture is smaller compared to conventional agriculture, having more extensive land areas, yet, this model has been changing lately with the emerging vertical agriculture type, trying to balance the green and grey infrastructure.

More features of urban agriculture can be found after the harvest, which goes further than just selling the product in supermarkets but includes social activities around food production (Metcalf, Minnear, Kleinert, Tedder & Newman, 2012). Food and Agriculture Organisation of the United Nations (FAO) defines U.A. as the growing of plants and the raising of animals whiting and in the outskirts. Cities around the world gather the largest number of people (UN-HABITAT, 2016). Local communities that produce products in their towns are capable of providing a decent amount of organic products for the inhabitants of a neighbourhood, which helps to reduce transportation distances (Dubbeling, 2015). Product exchange, low prices, and quality products help to activate the economy and also, create jobs which empowers communities to be more sustainable in their lifestyle. Cities have different approaches to managed food strategy plans for production and transportation.

Food problems are present in both developed and developing countries. For example, in some developing countries, it is more complicated to provide food to communities due to the lack of water, resources or weather conditions affecting the populations directly (Metcalf, Minnear, Kleinert, Tedder & Newman, 2012). On the other hand, in developed countries, they could struggle with managing food waste Jellil, A., Woolley, E. & Rahimifard, S. (2018).

The bridge between people and nature is becoming more abundant, due to city densification, encouraging developers to build on vertically way than horizontally, due to a combination of the lack of land, land-use policies and the improvement of new technologies that allow the use of more resistant materials suited to building higher. In some other cases, it is due to the centralised urban structure that concentrates the best economy and best job opportunities in cities. The products from the farms are more than vegetables and herbs. They are the effort of people trying to have a better quality of life, either to improve physical and mental health or to be part of a community. Studies in Japan (Soga, Gaston & Yamaura, (2017), have been pointing at the extra benefits of urban agriculture communities that enhances peoples' wellbeing and environment by building more sustainable communities to mitigate, e.g. climate change through selling and consuming local products which at the same time reduces food transportation (Kulak, Graves & Chatterton, 2012) and also helping ecosystem services to create micro-climates that prevent threats like heavy periods of rain or droughts.

Benefits of urban agriculture include: reducing the vulnerability of the most vulnerable groups, production of high-quality local products due to pesticides regulations in city environments, reduce the dependency of imported food, physical and mental health and sustainable communities. (See Figure 5.0, in the appendix for more benefits)

The possibilities of using green roofs for different purposes are expanding depending on the approaches of each green roof. For example, the city of Michigan in the U.S. known for the dominance of skyscrapers in the city is using this system of green roofs to reduce heatwaves and also to make use of greenery to have more energy-efficient buildings. Green roofs help to regulate temperatures, increase biodiversity, reduce noise and provide recreation areas, for restoration or physical activities. (Li, & Babcock, 2014). Green roofs are a good alternative to make room to increase biodiversity when there is a lack of space, and it is only possible to increase the green areas on existing buildings (Czemiel, 2010). The use of urban agriculture to mitigate and adapt to climate change can make a difference in society, and the cities, some benefits of using urban agriculture to encounter climate change problems are:

- Reducing vulnerability to the less beneficial groups
- Densifying urban food sources
- Reducing the dependency of imported food
- Maintaining green open spaces and enhancing vegetation
- Reduce heat island effect, by providing shades and enhance evapotranspiration
- Reduce the impact of high rainfall using stormwater management
- CO2 and dust capture
- Safely reusing wastewater and composted organic food
- Adapting to drought by using water flow and nutrient in water and organic waste
- Reducing energy and GHG emission by producing local food.
- Less food transportation

Green walls, roof gardens, vertical farming, and organic farming inside the urban areas have great potential of helping to improve life in cities. Each of these examples improves in different ways the urban experience, and they must be interconnecting for an efficient approach to decrease problems on a citywide scale. Biodiversity also benefits from urban agriculture infrastructure, research on green walls in Milan demonstrated the importance of green walls for bird species, providing shelter and food resources, green walls could support biodiversity in different ways (Belcher, Fornasari, Menz, & Schroepfer, 2018). To tackle one of the basic needs, which is food security, some developing countries like Siri Lanka have been using U.A. as a tool in their food plan strategies (Mattsson, Ostwald & Nissanka, 2018). A community garden could be life-changing for some people, not just for the harvest people get but from the additional benefits of community growing, these problems related to food quality and affordability, reduced ecological footprint, increased community cohesion, achieving greater community resilience and promoting urban sustainability (Tornaghi, 2014). Growing in cities which is a program has become popular again in recent years not just for the increasing problems of food security but also for the environmental psychology benefits and mitigation of climate change (Egli, Oliver & Tautolo 2016).

A high number of studies in the mental health field have proved the efficiency of gardening for people's physical and psychological health, leading to an increase the number of rehabilitation gardens where patients can work with gardens to be treated for psychological distress, depression and other problems. In the U.K and Sweden, this practice had become an alternative for medication treatments. In the report from (Clatworthy, Hinds & Camic, 2013) it is mentioned that the two leading theories to understand the benefits of gardening for mental health are the restoration theories of Kaplan and Kaplan, (1989;1995) and psychological stress reduction theory from Ulrich,

(1983). It is leading us to the importance of the improvement to urban ecological infrastructure in cities and even in the small scale on new buildings. Some of the results in the studies analysed by had a significant reduction in symptoms of depression, anxiety and self-esteem, due to the implementation of more green areas on cities (Clatworthy et al., (2013)

2.3.1 URBAN AGRICULTURE INFRASTRUCTURES

Urban settlements grow in different shapes and forms; linear, central, axial, radial, grid, or clustered (Ching, 2015) and green infrastructure does the same, yet, it is essential to keep those areas well connected to have an urban ecological infrastructure that connects people, fauna and flora Li, Liu, Huisingh, Wang & Wang, (2017). These type of urban shapes could also be applied in the same way on buildings to connect green and blue infrastructure. It is not enough to have juxtaposed, intermixed, or enhanced intermixed solutions; the ideal type should be an integrated ecosystem (Tedx Talk, 2018), that connects ground with the new infrastructure of the buildings.

Nowadays, new grey infrastructure tends to integrate green infrastructure for aesthetics, and in some cases like the "Vertical Forest" (Stefano, 2019) to improve environmental

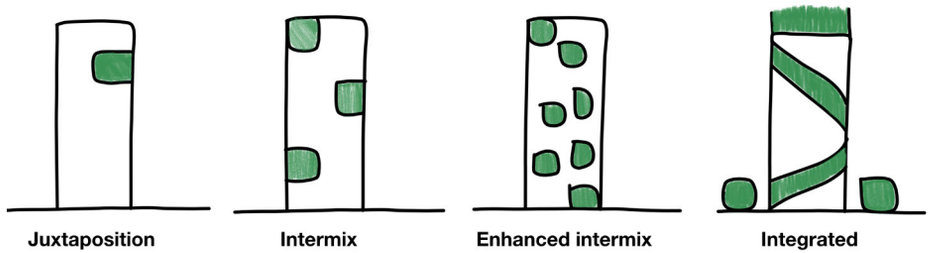


Figure (2.3) Diagram of different uses of green infrastructure in a building. (Tedx talk, 2018)

conditions of cities. However, there are very few examples of buildings, including community gardens, like "The Greenest of the Green" that are using most of the public areas for green infrastructure. For a better integrated sustainable system in gardens, It is recommended to use the forest system of layer for a better-integrated ecosystem, using high-small trees, shrubs, perennials, ground cover layers, root crops and climbers. This model helps the gardens to maintain and resist weather conditions better than other gardens with only one or two of these layers, (National Geographic, 2019), see Figure (2.4) which could be beneficial for reducing costs on maintenance.

During the research there were found five types of urban agriculture infrastructure, yet, only one, the "community gardening", was studied in more detail, due to the close relation with the topic of the master thesis and all the benefits on communities. The community garden-type also fitted better the research from the beginning, which also matched the research questions. The other types; allotment gardens, private gardening, guerrilla gardening, commercial gardening, and rehabilitation gardening are no less important, yet, are briefly mentioned for those parts where community gardens were not part of the solution on the design principals for the Culture Casbah proposals.

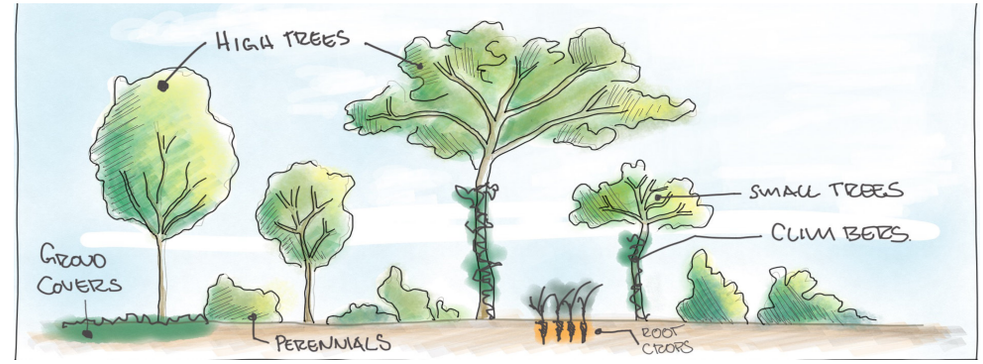


Figure (2.4) Diagram of six layer of vegetation ideal forest garden

Guerrilla gardening is the only one that is not a regulated solution from the rest of the other groups. It acts on its own to adapt areas that are mostly abandoned or unused by public or private owners, they commonly found on vacant land, e.g. at the edge of railways, abandoned buildings and corridors (Hardman, M., Chipungu, L., Magidimisha, H., Larkham, P., J,. Scott, A., J. & Armitage, R., P., 2018). One example is the Incredible Edible network in Todmorden, U.K., which started as guerrilla gardening but is now a registered.

Allotment gardens mostly owned by the municipalities are hired to people actively involved in agriculture practices that most of the times have no access to gardens at their homes. Allotment holders are very mixed and diverse. Many of them involved in growing food but many others growing, flowers or depending on the allotment site regulations just for the aesthetics and relaxation. Soga, Gaston & Yamaura, (2017).

The rehab garden is famous in the U.K. and Sweden. These gardens are used by people with different health problems such as diabetes and depression and are specially designed, made and maintained to improve patient's conditions (Soga et al., 2016). Alnarp rehabilitation garden is an excellent example of this type of garden. However, this kind of garden is not frequently found in cities due to the patients need for calm environments which are rarely found in urban settlements due to noise pollution (Nilsson, 2011).

Commercial gardens, which are mostly privately owned for commercial proposes, and finally, the housing gardens which are located on residences, buildings, for individual use in most cases. It is rare to find nurseries in buildings that are public gardens. An example of this type is the Bowery Farming vertical farming which produces large amounts of salad for the city of New York (Bowery Farming Inc. 2019).

Community gardening is the most studied type of building communities. It was the only one included in the theoretical framework more in the concept of housing buildings, these gardens are open for public and in some cases start from the bottom up participation, with a group of volunteers and very little support from other groups and organisations. The land could be owned by the municipality or by a private landlord, in which case landlords provide the property and the municipality the services to help the community of farmers.

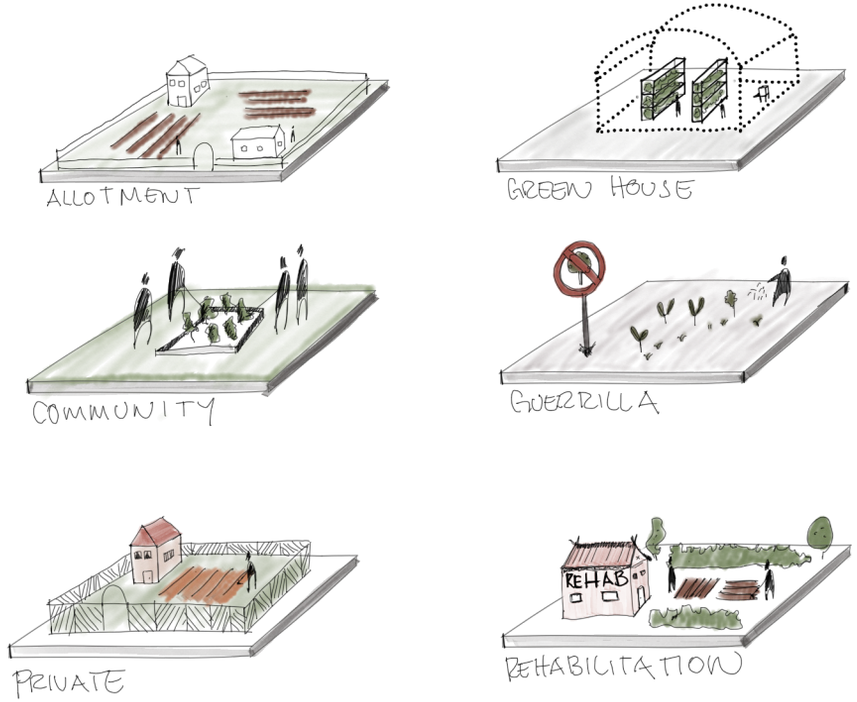


Figure (2.5) Diagram of urban agriculture infrastructures.

The community gardens are the most common places to exchange knowledge; gardens are generally dedicated to food production. They can be found in parks, schools, green corridors, or buildings. An example of these gardens is the community garden of Botildenborg. Both international and local examples of community gardens, have starting models with almost the same principals, with bottom-up participation. Some of the areas to start growing are commonly found close to houses, apartment buildings, green spaces around buildings, flower beds, vacant land, parks, patios, walls and roofs. Some cases could start with the guerrilla gardening without any permission or legal support to approve the activities of growing in a place. It is questionable if this is the right way of involving

Figure (2.6) Image of community garden Enskifteshagens stadsodling.

people in gardening or recover private areas for public appropriation. Nevertheless, groups have succeeded in their intentions or increase the awareness of the authorities to provide areas for this practice without illegal actions. Some examples gained popularity in their communities, and they are now supported by municipalities and local authorities like the project, (The incredible edible, 2019)

The community gardens could be seen usually in pallet boxes. These could be for the quick and easy construction of building a garden of raised beds, which are simple to sort and organise and more accessible. It could also be due to soil pollution, an example of this problem in the community garden in Enskifteshagen, where the soil contains pollutants coming from the industrial areas in the surroundings. The initiative requires raw materials like; soil, seed, water, and compost mostly provided by the local authorities.

Tools for gardening are fundamental for the work. In some cases, people have their own tools and if the plot is small and is not for intensive production, it will not be a problem that the farmers handle them on their own, however, if the gardens are public, many people are participating in the same area, it is fundamental to have secure storage with tools that everyone can access. Stakeholders and local authorities could also provide these tools. With examples of urban agricultural communities in Malmö and around the world, it was possible to identify some of the essential roles, actors, and components of U.A communities. The following diagram represents the components to create a community of urban agriculture some of the main actors, and how they interact together to achieve a successful group. The diagram (2.8) was the result of a series of questions were used to comprehend how a community it is created, and all the important actors involved in the community gardens. For example, who is the provider of services? Such as water, soil, pallet boxes, who will manage the garden? Who is the owner of the land? Who is responsible for the garden?

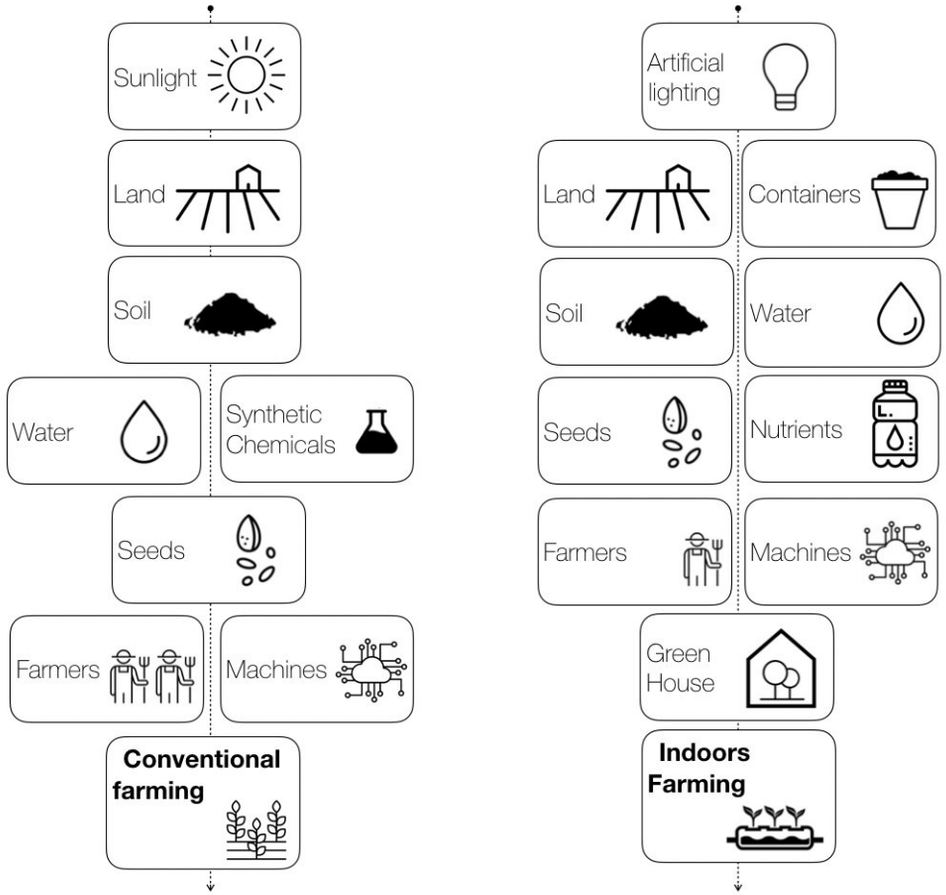


Figure (2.7) Diagram of the basic need of conventional farming and indoor farming.

2.3.2 STAKEHOLDERS IN URBAN AGRICULTURE

For these previous questions and some other examples of community gardens, it started to emerge the following diagram enlisting the main actors found of most of the gardens in Malmö. The following graph shows the importance of each of the actors involved in this model.

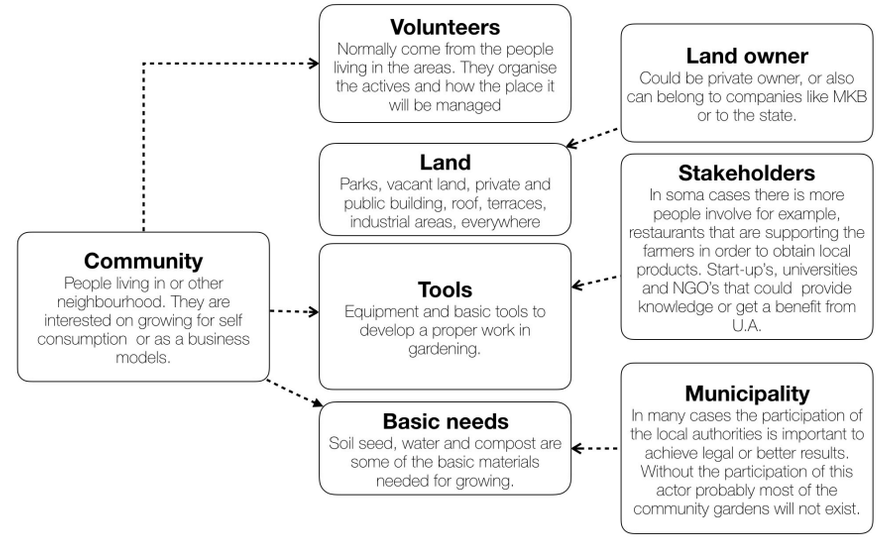


Figure (2.8) Diagram of actors involved in community gardens.

The main actors involved in urban agriculture come from different economic status, religions, genders, ages and it is open to any user living in the cities, "If you eat, you are in" that is the Incredible Edible slogan, to pronounced that everyone could join the activity (incredible edible limited, 2019). Each of these groups participating passive or active in urban agriculture have different role and purpose on the activities. Today it is common to see young students learning the process of growing vegetables in collaboration with NGO's in Malmö. Similarly, with vulnerable user groups, including immigrants, women, and refugees, among others. Urban agriculture has been active for many years in Rosengård, and now it is common to see volunteers, municipalities and companies working together. Many stakeholders and Malmö Municipality have been trying to improve quality of life in Rosengård, with bottom-up, stakeholder's form NGO's, joining forces to mitigate some of the problems mentioned before. Non-profit organisations have been involved in programs to integrate refugees and immigrants into Swedish society. Landowners, either private or public, are positive about providing land to get benefits like aesthetics, less vandalism, among others. Municipalities are also involved in the community gardens by providing services to make the work efficient and encourage public participation. Stakeholders from NGO's, universities or other businesses which are part of the food industry could benefit from having local products in their restaurants, or even hospitals could use community gardens for patient therapy.

2.3.3 THE NGO's OF URBAN AGRICULTURE

The community garden organisation differs depending on each country, city and even neighbourhood. Therefore it is also important to consider features like policies, land use and the approaches of how the local authorities intervene urban agriculture; each of these features could differ from each depending on the perspectives, for example, architects, farmers, local authorities or children. Users in the communities can also achieve their goals in different ways, some of these groups e.g. the guerrilla gardening community, use more radical strategies to obtain land for agriculture, or some other groups work together with the local authorities providers of tools or material to use and make it easier for people to get involve in U.A. However, there are many groups around the world with different approach of using urban agriculture. Some groups in Malmö use U. A. for wellbeing, environmental benefits, other groups use it to be less depend on imported products, and in a few cases to create job opportunities. The benefits of U.A. agriculture could be immense.

The groups, communities and NGO's in Malmö are well known for being actively involved with bottom-up participation and for the case of urban agriculture organisations, this is not an exception. In Rosengård district NGO'S are working with children or with vulnerable groups like immigrants and women which struggle to difficulties to fit in the society, (Eizenberg, 2012). These groups mainly help people with seeking jobs using the community garden project as a tool to teach them about agriculture or to learn a profession that will help to improve their chances of finding jobs.

One of the most active organisations in the city of Malmö is Botildenborg which is based in Rosengård has different projects with user groups like children, refugees, immigrants and local residents that are guided on agricultural practices to learn about the process and meanwhile they also grow new communities and more social sustainability through the gardens (Vallance, Perkins & Dixon 2011) . As the Botildenborg organisation, many other no-profit organisations have been working on bringing back crops into the cities due to all the side benefits, such as more local producers, healthier communities, and reduction of greenhouse gases by increasing green areas adopting more sustainable lifestyles in the neighbourhoods. Studies suggest that U.A. could be a small part of many other actions that could improve the living conditions in urban settlements (Poulsen, Hulland, Gulas, Pham, Dalglish, Wilkinson & Winch, 2014). People without a job can join and work in construction or gardening to learn more about of those trades and ,also to learn about Swedish culture and the language, and also get more involved in their society. "Yalla Trappa" is another organisation that provides job opportunities for immigrant women that have been struggling to find jobs in Sweden. Ghada Yassin explained her experience of how she found Yalla Trappan through the employment centre, and how to be part of a working environment to meet new people, made her happy and it is better in comparison of being at home alone, (Malmgren & Lindberg 2018). Urban agriculture is opening an opportunity for all the vulnerable groups in urban settlements to be active in their society. Most susceptible groups live isolated from the community, and many of them have no jobs. Due to this, urban agriculture facilitated by NGO's offer an excellent opportunity to increase their chances to be active in the community and also to learn a profession to find jobs. Other problems affecting the living environment in Rosengård are as an example negative image, lack of attractions, physically and social isolation, surrounded by barriers and weak links to the city's pedestrian network (Malmgren & Lindberg 2018).

In Rosengård, the rates of unemployment are higher in women than men. As the Yalla Trappa in Rosengård and WEN NGO's (Metcalf, Minnear, Kleinert, Tedder & Newman, 2012), had offered the opportunity for women to be part through volunteer jobs to develop some skills. In the case of WEN, with U.A., unemployed women that had psychological barriers or facing a cultural shock, have found it useful to develop confidence and to learn a duty that in the future could help them to become more confident and even obtain a job. In the documentary 'Yalla! Vi lever' Mona Mahdi mentions that it is difficult to become part of the Swedish society when people recently moved from other countries. For some of the workers like Taghrid el Ali "Yalla Trappa is more than a place to work, feels like home". Yalla Trappa has a community garden where workers and people living in the area participate in growing vegetables or herbs that later on could be used in the kitchen (Malmgren & Lindberg 2018).

Farming without borders is an excellent example of social programs involving people into the Swedish community thought the use of growing vegetables, herbs and plants in general. For some people in Sweden could take more than three years to find a job, yet, programs like 'Farmers Without Borders' a project by Botildenborg offers possibilities on learning a trade or the opportunity to learn Swedish by talking to other farmers. Indirectly the program is more than growing vegetables but to integrate them into society.

Using gardening to benefit communities is essential in Rosengård's district, due to the high number of immigrants living in the district, it requires constant participation from NGO's and organisation to integrate segregated communities into the Swedish culture, living and working environment. Especially for those recently arrived communities that have no cultural references or do not speak the language of the place, they are living. Urban agriculture offers that option of encouraging ownership through gardening activities. (Eizenberg, 2012).

Another program from Botildenborg is the School Garden, which is designed for children between five and eight years old, so they can learn about agriculture activities, how food grows and also to learn about the biodiversity of the gardens. This program is inclusive and encourages to have a mix of participants due to the socio-economic classes (Botildenborg, 2017). Children do not just learn about ecological process but build social skills.

2.4 URBAN AGRICULTURE SOLUTIONS

Today, most of the cities around the world are using the conventional farming model, in which agriculture is located in the countryside or in the city's outskirts to fulfil the people's demands this is due to the demanding space required for monoculture intensive production. Using an intensive model of agriculture requires the use of herbicides, pesticides and fertilisers due to the lack of biodiversity (Gomiero, Pimentel & Paoletti, 2011). Conventional farming is and will still be the primary provider of food resources, and it unlikely that it will change into another model entirely that can provide enough resources to nations. Population growth, land erosion, long periods of drought, lack of quality products and waste of energy resources in producing and transporting the products into the cities is result of an inefficient management of resources and strategies feed people in the cities which is now depending on the conventional farming models which has been reappearing in cities to reduce the effects of GHG caused by the intensive farming (Gomiero et al., 2011).

Although there is a lack of space in cities because of new constructions, cities also have those areas that nobody uses, abandoned buildings, due to some legal problems. Many of this abandoned land buildings, or industrial sites, are suitable for urban agriculture, which could solve troubles of vandalism, heath risk, among others with the right policies and support from the authorities. Scholars have argued the importance of public participation in this kind of appropriation strategies, indeed when the public is involved, however, this participation is based on people's intentions, and it could be successful in many cases, and some other could be conflictive.

Recycling grey infrastructure might be one of the most sustainable approaches to improve the cities yet. Adapting green infrastructure in an existing building is not an easy task due to the limitations of what the structure can support, surface or technical requirements to drain rainfall demand a vast amount of resources. However, using green roofs for Urban Agriculture purposes, it is not as popular as roof gardens for regulating temperature, for aesthetics, or wellbeing purposes.

Figure (2.9) Diagram of urban agriculture solutions; conventional, greenhouse, green-wall, green-roof and vertical farming.

Green roofs model or roof gardens are divided into two categories, intensive and extensive. The first category is characterised for having deep soil layers. They can support larger plants and bushes, typically maintain in the form of weeding, fertilising and watering is needed. The extensive are made with a thin layer of soil design for supporting small plants, such as ground cover, perennials and plants with smalls root systems, to have low maintenance. Intensive roof garden standard measures for soil thickness is from 100mm to 1200 mm and for extensive goes from 20 mm to 150 mm according to different literature (Czemiel, 2010). The following image shows the essential components of conventional farming to provide food production. The land, soil, water, sunlight, seeds and the labour force from farmers are the basic features essential to start growing food. It could be developed by using machinery and more advanced tools that provide a better practice to reduces losses and have a more efficient workflow. In places where the climate is not optimal for growing during the winter season, as in Sweden, greenhouses are an optional solution for growing all year round for indoor growing, and in Malmö, this is a right solution against wind, darkness and weather. Green Roofs are famous and used already on an existing building that has the structural and conditions to have a garden to improve the energy efficiency on air-conditioning, aesthetics, biodiversity or food production, and beekeeping. When the space in cities is limited, but there is a need for green areas roof gardens have the possibility to improve conditions. However, access to these areas is limited in terms of people and maintenance. Most of the times, buildings are privately own, and only people living or working in them can have access to those gardens. Also, the cost of adapting a garden to the roof could be expensive, depending on the project. Urban expansion limits use of areas for agriculture, yet, the new urban infrastructure could offer that balance on building urban ecological infrastructure with it, in most cases.

Figure (2.10) Visualisation of the roof garden "The greenest of the green" by TA companies.

Conventional farming refers to growing food in a conventional way, could be adapted into outdoors solutions in buildings, placing them adjacent to the base, inside the building or on the roof, each of these locations will have demand specific adaptations due to the placement. This solution depends on the specific environment; for this solution, it is crucial to consider the weather conditions, rain and sunlight and could be located in many parts of the building. In the indoors solutions, there is a common practice growing in hydroponics, creating a system more controlled and suitable for small surface but well-controlled from outdoors. However, it is essential to create the right conditions to have the most natural environment. One example of this case could be on the roof location, in which crops must be adapted to the roof structure without damaging the materials due to the weight, water filtration or humidity. It is possible to find a benefit depending on the project, and it is possible to collect or store water from rain. Balconies, rooftops, underground, the entrance of the buildings, and other public areas on the ground floor can also be utilised in the same way.

Figure (2.11) Image of conventional agriculture in a small scale as allotment gardens.

Greenhouses are efficient in places where the weather is not optimal for growing the whole year. A Green House requires specific technical systems and measures to take into account in their planning process. Location materials, production type, number and the level of maintenance, accessibility, irrigation systems, ventilation among many other features that must be considered. The Greenhouse requires south orientation, water sources, drainage, accessibility, artificial lighting and electricity or another source of energy to provide the conditions needed for optimal growing conditions. (Clatworthy et al., 2013).

Figure (2.12) Visualisation of Green-house of the project "The greenest of the green" by TA companies.

Green Walls are a solution which can be used for urban agriculture; it is used mostly in Façades of a variety of building structures, according to (Perini, Ottelé, Haas, & Raiteri, 2013) there are three types of green walls; 1, direct green system, 2, indirect green system 3. Combine with planted boxes. These Urban agriculture infraestructures of vertical greenery are designed for different conditions. However, one of the main functions is to reduce the Urban Heat Island effect due to the distribution of city buildings, the construction materials, lack of permeable surfaces among others (Sheweka, S., & Magdy, A., 2011). Nowadays their functions it is more than just creating micro-climates, green walls have been used to be energy efficient in buildings to reduce cost of heating or cooling indoors, can be used for water retention, to absorb greenhouse gases, aesthetics, food production and in general terms, a well base design of a green wall could improve the ecosystem services significantly (Li, Liu Zhang, Zhao, Liu, Zhou & Wang, 2017). Each wall design has specific characteristics depending on different factors: the vegetation, climate, location (indoor or outdoor), materials (modules, and the function that will contribute to the building and the surroundings.

Green walls can be used in combination with other design solutions to improve quality of life by using vegetation in areas on the buildings lowering temperature indoors and in other weather condition. Using a diverse vegetation pallet could benefit pollinators and create connections with other green areas to increase biodiversity. Another benefit is the reduction of noise pollution, helping to improve the wellbeing of people living with these design solutions (Li, Liu Zhang, Zhao, Liu, Zhou & Wang, 2017). Some examples for growing vertically are: Tomatoes, peas and beans, cucumbers, squashes and melons, for these examples is it possible to grow them upside down. However, it is vital to consider the height from where they are hanging, due to safety regulations depending of each country. The design of this climbers most be considered to avoid accidents at harvest time.

Vertical farming is a model used by companies, and individual growers who look on having intensive production and have no large areas to grow could be an optimal solution. It favours roof gardens design to fit the structures. Another benefit of growing indoors is the possibility to grow vertically, or stacked, in restricted spaces. Urban sprawl could limit

Figure (2.13) Visualisation of Green-wall of the project "The greenest of the green" by TA companies.

access to land and inside cities which is a big issue. The quality of the products is high, and the use of new technology is necessary to make this type of farm productive and functional. According to Al-Chalabi & Malek (2015), vertical farming requires access to sunlight to generate energy through solar panels. This energy will be used to pump water and for lighting the building all this with the idea of having a sustainable approach. To have an efficient carbon foot print equally compared to ground-based solutions must use renewable energy to be efficient. This study from Al-Chalabi & Malek (2015) afirms that vertical farming is in an infant stage with many expectations to fulfil the need for next generations and in combination with other sources of food production could be a complement for solving food access in the cities.

Experts have encouraged us to have a better integration of urban ecology infrastructure approach to the plans and agendas to develop more green sustainable solutions updated to our needs nowadays, that could counterpart the existing model of convectional farming, through recovering vacant land, adapt already existing structures or land to grow food and finally in new developments planners and designer have started to be awarded of including urban agriculture opportunities. In the last section, some of the different urban agriculture infrastructures in cities were explained, and now these U.A infrastructures have a solution that could be adapted in a specific site or building, (Li, Liu, Huisingh, Wang & Wang, 2017).The solutions increase due to research studies and advanced technology. Different solutions to solve this problem have starting to appear in urban environments. However, the context in an urban settlement is challenging to integrate agriculture into grey infrastructure, which is using most of the land. Different urban agriculture solutions can be integrated into buildings, both horizontal and vertically. For horizontal solutions could be solved by using raised beds or directly on special structures, roofs, balconies or terraces, in the vertical direction they can appear as green walls.

Figure (2.14) Image of vertical farming in Rehab garden Alnarp.

2.5 GLOBAL EXAMPLES

The Greenest of the Green is a housing development project that resulted from the work of a multidisciplinary team with the purpose of designing a housing building with a low budget, and that could be greenest as possible. Including the development process of designing until the construction stage, with the aim of being the greenest of the green. The building, in Helsinki in Finland, was developed by TA Companies, designed by Talli with the collaboration of many of other institutions including the Alvar Aalto University and the Finish Innovation Fund Sitra. The people involved in the project decided to test their ideas of the benefits of this green living environment through experimental design on a real building populated and used by the residents. The project started in 2011. The project is divided into two buildings, one with 55 flats right occupancy homes and the other one with 66 rental apartments. The main concentration of greenery lays on the roof which is a mixture of different types of green roofs such as meadows roof (for biodiversity) a roof kitchen garden, a forest berry roof garden and a yard garden. The building is more about green areas; it also covers how it is managed, the use of energy-efficient adaptation solutions that allow energy reduction among other solutions to keep the efficiency in the building. The kitchen garden located on the roof is a place where residents can have their crops to grow food and also to socialise with the neighbours. This project it is an inspirational project to take into account when designing new inner-city buildings, mostly due to the commitment of each of the participants of the project (TA Companies, 2017).

Figure (2.15) Image of the flower beds in the roof of "The greenest of the green" by TA Companies.

Figure (2.16) Visualisation of the Building "The Greenest of the green" in Helsinki , Finland.Designed by TA Companies.

Bosco Verticale or Vertical Forest (Stefano Boeri Architetti (2019) is a two-tower housing development, 26 floors high, located in Porta Nuova, Milan, Italy, and designed by Stefano Boeri (Reference) . This design is a result of the current state of the environmental situation in Milan, which it planned to address by absorbing CO2 pollution using 1500 trees to clean the air. The construction started in 2012, and it was finished in 2014. For the dense vegetation design, multiple aspects were considered; design integrations, structure elements, and the ecosystem. Around 50% of the facades of the towers are covered by vegetation, 40% in elevation. It was required to install irrigation systems in combination with rainwater collection systems that allow using grey-water to irrigate the vegetation in the terraces. This system is located outdoors, and it is not insulated against cold. The terraces are designed in cantilever approximately 3.30 m deep and up to 14 m long in some cases. For shrubs, the depth is 0.50 m, and the height is 0.50 which means that to make this terrace possible to build it was necessary to use pre-stressed concrete slab to support the weight of the trees, soil, shrubs and people in the same place.

Plants and species used in the facades include more than 13,000 plants of 90 different species and hundreds of mature trees were lifted to the balconies reaching up to 100 meters from the ground. These trees and plants were specially selected to avoid high maintenance, allergies, or producing big fruits. The orientation of the towers was also crucial in the selection of the species, and consideration was given to which of the facades face the sun or are in shadows, olive trees were used in the south-west facades and cherry to the east and north facades. Wind speed also was an influence on the tree's selection. (Tokuç & Inan, 2017). Green wall, roof gardens and some other types of green infrastructure has been tested on the Vertical Forest in Milan, proving the relevance that this kind of infrastructure have with the biodiversity as part of their living environments in the urban settlement, they do not just provide services and wellbeing to humans but provides refuge to birds, insects and other urban fauna.

The study focused on the importance of having green corridors and dense greenery in high buildings and how it benefits the ecosystem services in the city of Milan by observing and counting the number bird species using 27 green walls and 27 grey walls to find in which cases the birds are more present. The result showed that Vertical Forest has the

Figure (2.17) Image of the project Vertical Forest.

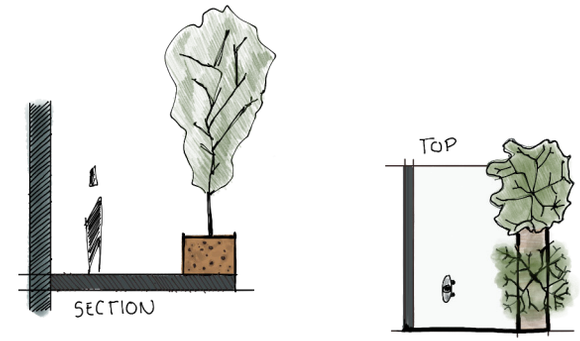


Figure (2.18) Sketch of the balconies of the Vertical Forest Section and Top view.

most diverse amount of species and also the highest number of birds whilst some of the other green dense buildings had a small presence of birds. It is showing that birds use more optimistically tall, dense buildings. Bosco Vertical and the hotel VIU had more birds, this could be because they both have fruiting trees that can provide food sources and nesting to some species, although the study is positive it is not enough data to determine that dense network greenery in buildings is enough habitat to support local bird species, (Belcher, Fornasari, Menz, & Schroepfer (2018).

A case study in two countries, Sri Lanka and Argentina, was made by the RUAF foundation of how to integrate urban agriculture into climate change plans. In these cases, Rosario, Santa Fé and the Kesbewa have a history of been actively involved in urban agriculture production. Nowadays, the context of the city has changed, and it is facing problems with flooding, sea-level rise, and increasing temperatures. The cultivation plots have been abandoned or been used for the expansion of the grey infrastructure like housing developments or commercial uses.

Western Province in Sri Lanka, with a population of approximately six million and about 25 % of the national population is one of the biggest contributors of GHG in the world. Food transportation has been one of the most significant sources of GHG in Sri Lanka.This study was following by a pilot project of intensifying urban agriculture in private land, up to 600 ha of paddy land, (RUAF, 2019)

The selection of products to grow was selected based on their potentials to replace imported food. The participants in the cultivation received training for cultivation process, plant nursery and for promoting their products in the market. The technical assistance was focused on vertical structures, irrigation methods, and intense bio farming. This program reduced 60,200 kg of the cities organic waste, which was composted and used in the gardens, instead of being transported to landfill areas. The stakeholder's municipality institutions and other organisation involved in the project were highly active, providing the services in their hands. This study is great example of how U.A could significantly enhance a vulnerable community by promoting local producers to start their own business and also become more self-sufficient food producers. In terms of environmental benefits, the reduction of flooding by using crops for water retention is applicable to what was found in Rosengård, (Dubbeling, 2015).

SECTION III

3.0 CASE STUDY

Due to the broad topics involved in the theme of urban agriculture and the case study Culture Casbah, it was essential to narrow down and find the similarities between the case study and the urban agricultural infrastructures. To set the limits for the study I focus only on the research questions and themes which were guided by the literature review in section two, intending to understand the context of Rosengård and what role it plays on the Öresund region, then in Malmö. The first scale of the study area was delimited by the comprehensive plan and the strategic plan, which covered in general terms Rosengård district and Skåne Region (MKB, and Gehl Architects ApS. 2011). For the competition, the study area for Tornrosen and Örtagården was delimited on the north by Almiralsgatan, on the South by Hårds väg, on the West by the railway and in the East by the street Adlerfelts väg.

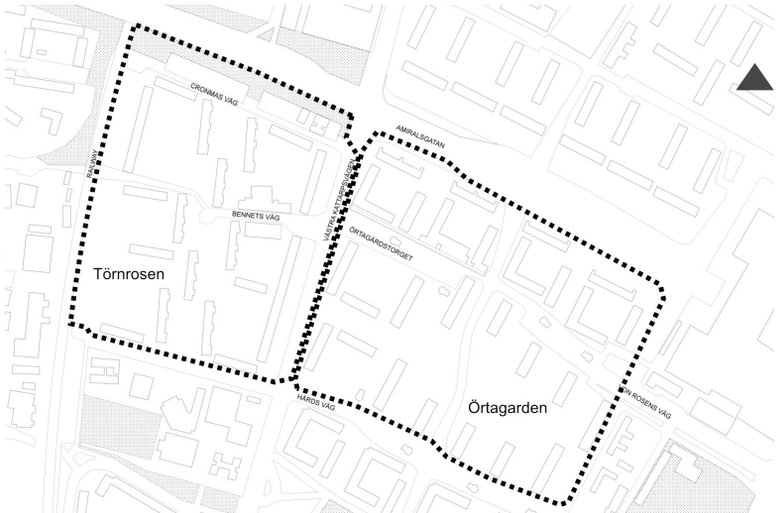


Figure (3.0) Map the limits of the study area.

Finally, Lundgaard and Trunberg, the Danish design firm went into more detail on the site analysis to design the densification plan for Törnrosen and Örtagården neighbourhoods. The study area is divided into two parts, the first one corresponding to Törnrosen neighbour located on the west side and Örtagården on the east, both with similar design features and same user groups in the neighbourhoods. The case study is divided into two parts. Firstly one is dedicated to studying analysis of the area, taking into account, infrastructure, public transportation and commuting, open spaces, green areas including urban agriculture gardens and daily life. The second part is the analysis of the Culture Casbah proposal, which was a brief analysis of the public areas, design solutions and how the design firm Lundgaard and Trunberg interpreted the strategic plan and the City of Malmö's comprehensive plan for a sustainable city, with the intention of highlighting the importance of community gardens in the requirements for the design.

3.1 IMPRESSIONS OF THE STUDY AREA

Part of the Rosengård district was built with the million-program aiming to develop affordable housing between 1965 and 1974 in the urban settlements in Sweden. After the Second World War, there was an increasing demand of housing, in the case of Malmö building took place on the city edges (Hall & Vidén, 2005), due to the urban expansion, the million-program is now merged with the rest of the city, having an unclear connection with the closest neighbourhoods sharing physical borders. Rosengård is located on the south-east in Malmö, and it has ten neighbourhoods: Apelgården, Emilstorp, Herrgården Kryddgården, Persborg, Rosengård Centrum, Törnrosen, Västra Kattarp, Örtagården and Östra kyrkogården. The population in Rosengård is 23,758. Source: Processing of data from the Swedish migration board and Statistics Sweden.

Törnrosen was the first part built in the district in 1965 and Örtagården was built in 1967, both cases received critiques due to the modern architectural design. The apartments vary from one to five rooms, but the most predominant is the three-room apartment. (MKB Fastighets AB, 2011). In terms of urban structure, the neighbourhood of Törnrosen and Örtagården have a clustered urban spatial organization in architectural scale, which mean that the building placement creates a semi-private common area for residents of those buildings. This is present in both neighbourhoods and also with buildings of different heights, in most of the cases the groups of buildings have access to green areas which will depend on the scale of buildings and courtyards, some examples are playgrounds and sport courtyards such as table tennis and floorball fields.

Figure (3.1) Map of the boarders of Rosengård district and the two neighbourhoods Törnrosen and Örtagarden.

The urban structure of Törnrosen neighbourhood gathers mostly higher buildings of nine floors, in a surface of 120,054 m2 approximately and in comparison with other neighbourhoods is more clustered than others, this is due to the short distances between the buildings and the location of them making them have pedestrian roads changing directions at every corner. The greenery is abundant, and many trees in between the buildings are mature and tall, reaching more than a half of the height of the buildings, making a feeling of been enclosed in between the buildings, trees and roads. Örtagården feels more open, and the spaces between the high buildings are more abundant, in which generally are found lawns and green areas with young trees that are not as tall as the ones found in Törnrosen.

3.2 PUBLIC SPACE ANALYSIS (TÖRNROSEN AND ÖRTAGÅRDEN)

The public space analysis was made after studying the Gehl strategic plan for Rosengård (MKB and Gehl Architects Aps,2011), in which is listed several problems in terms of urban planning, wellbeing, social interactions and aesthetics. The list is divided into visions and spaces, concluding to enhance the quality of life in the site. On the site visit, it was essential to identify and match the solution for Culture Casbah proposal within the list made by Gehl and finally verify the improvement or degradation. Breaking down the barriers was present throughout the document, and it makes a clear emphasis on connecting Rosengard to the rest of the city. The architecture of the million program is mono-functional, limiting the services on the site. Housing is predominant in the site, and no services are open during the night. The scale is not human, and the lack of green areas is significant. There is a disconnection between public and private spaces and a need for densification. It is having all the recommendations and problems from the strategic plan to the study visit in Rosengård. The was conducted during the daytime between 12.00 and 16.00, the main purpose of the visit was to identify the most active hours and to get a clear impression of the place: buildings, roads, meeting areas, urban furniture, and vegetation as well as the use by people; active place for shopping, transition, meeting and commuting.

Örtagården has 1422 apartments form the original 1600 planned. In the neighbourhood there are two types of buildings, the first is the three-storey building around yards, with red bricks façades. The second is buildings with eight floors. In this neighbourhood is located the Bennes Bazaar, Rosengård Centrum, Yalla Trappa, Community Gardens 2, and 3. Ortagården population is 4,941 inhabitants.

Törnrosen is located between Almiralsgatan on the north and Hård Väg in the south and the railway on the west and on the east with Västra kattarpsvägen. It has 997 apartments from 1200 initially that were turned into commercial or other public areas. Törnrosen population is 3,134. The area consists of two types of housing the slab houses with balconies (three floors) and larger buildings (seven and nine levels). Most of the housing's apartments have yellow façades made of bricks. The famous Landmarks are Zlatan Court, Rosengård train station, Medical Centre, Benne's Bazaar, Sparvens Förskola, and the community gardens.

Figure (3.2) Image of Rosengård, showing buildings and a playground, known as Röda Matta.

Between the two neighbourhoods, and surrounding them, physical barriers are present, limiting the access by foot and prioritising the use of cars in the area. The Figure (3.0) shows the two neighbourhoods and the main roads which at the same time connect and are the barriers that delimited the accessibility from other neighbourhoods around. In both cases, access to green areas is present and is used by the locals for different actives. The composition of the urban structure is based on surrounding buildings with access to green spaces.

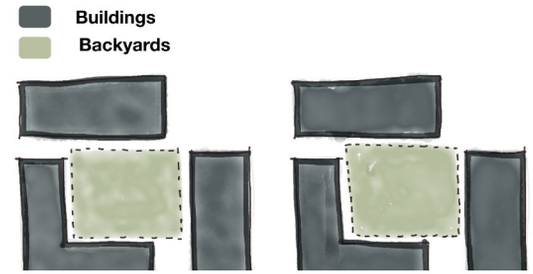


Figure (3.3) Cluster urban spatial organisartion map of the buildings in Rosengård.

The first study visit took place on, the 8th of February and the last one was the 16 of March, all the visit were between 12.00 and 16.00 and the primary purposes for this visit was to understand more in detail the area where the new housing development and the Culture Casbah will be constructed. The areas are located in the centre of the Rosengård district from Tornrosen to Örtagården and dominated by housing buildings from the million-programme densification plan in the 1960s. Many of the buildings are three floors high, with some exception where the building can be eight floors. The green areas are semi-private located between the housing buildings or behind the main streets. The Bazaar is a meeting point where there are a few shopping places available including greengrocery shop, hairstylist, butcher shop, restaurant and some other shops which are closed permanently. Even though some of the shops are not open or are abandoned, the area is visited frequently by locals coming by foot, car or bicycle. During the first visit, 40 people were counted coming to the Bazaar and also passing by. On the site analysis, two of the sites presented the most activity in comparison to the rest of the district, Rosengård centrum and Bennes Bazaar, the only two areas with access to services, e.g. restaurants, shops, hairdressers, library.

The public areas within the housing are mostly lawns and sometimes working as backyards in large dimension in between the buildings with particular areas for barbecues, playgrounds, football fields, multifunctional sitting and tables. It lacks biodiversity in most

of the yards, except for some small intervention in the gardens located at the entrances of the buildings and those ones close to the buildings managed by the residents. Some interventions are wooden boxes for agricultural purposes. Most of the social meeting places in the back yards have playgrounds, benches, with board games, football fields, tables, trash bins and some other furniture. In some areas like Benne's Bazaar, the furniture is new, but in some other areas like the back yards, the playgrounds are decaying or just getting old. Lighting bins and other furniture are not very common to find compared to other districts. However, the site is well maintained.

Cycling paths and parking areas are common in the Bazaar, many of the people pass by the area without stopping due to the famous bike road going to the city centre. The conditions of the roads are well maintained with signs, public bicycle parking is limited and only can be found at the entrances of the buildings. People pass by Benne's bazaar regularly, but also many people come to the shops by bike. In comparison to other districts of Malmö, e.g. Centrum, there is a reduction in cyclists. Urban agriculture gardens in Rosengård are one of the most active in terms of urban gardening, and several places have been actively maintained by inhabitants of the district, partly supported by

Figure (3.4) Detailed map of green spaces and the two neighbourhoods Örtagarden and Törnrosen with the activities.

Malmö's Municipality and NGO's. The gardens are spread in parks, green areas around buildings, stores, public buildings, parking lots, etc. Many of these cases, used wooden pallets to cultivate due to the risk of soil pollution, some other cases they used them to facilitate the production or even just for ergonomic reasons. In the study in the two neighbourhoods, using the centre on Benne's Bazaar were found 12 community gardens,

Figure (3.5) Detailed map of the urban agriculture infrastructure in the two neighbourhoods

from just small pallet boxes to allotment gardens where people are highly active in productions.

Odla I Stad (Growing in Town) is a community of residents from different neighbourhoods working along with volunteers, the municipality and other farming organisations in the city. It started in 2009 in the neighbourhood of Seved and some other areas in Rosengård. Today the duties included an educational program in schools and collaboration with other groups. One of the aims is to promote food production for self-consumption, healthy communities bonds and a more sustainable lifestyle. Odla I Stad has been working together with students, teachers and researchers from SLU Alnarp, and they have been involved in projects to spread their experiences through lectures and visits to the community gardens to promote their work. On the entrance of Yallatrappan, there is a community garden managed since 2011 by MKB, Yallatrappan and residents of the buildings surrounding the community garden. At the backyard of the Tegelhuset there is another community garden with small pallet boxes, berry bushes, herbs, vegetables and some fruit trees, managed by the locals with the support of Bostads AB Gröningen which are the property owners. Many more plots are found in the neighbourhood in Örtagården and Törnrosen with will be presented on the following map. At this moment Odla I Stad and MKB are running ten different gardens around Örtagården mostly using pallet boxes, base ground plots where approximately 30 participants were actively growing. In this area, two preschools are involved in the community agricultural network. This initiative has inspired other residents in the area to start growing their herbs and vegetables in their own homes on their balconies, and it is popular to see them covered with pots with different

herbs. The most common selections for the growers are vegetables, berry bushes, fruit trees, mint, sage and oregano. Some of the gardens are now equipped with irrigation systems to enhance production. In Törnrosen neighbourhood only three urban agricultural gardens were found, less than the ones found in Örtagården which has eight. See image (3.5) to locate the community gardens.

Urban agriculture infrastructure No.1 (Figure 3.6) is a small community garden with nine boxes and one small flower bed on the ground, floor. The garden is fenced with willow branches to delimit the area of approximately 128 sqm. However, the access to the garden is now visible from far due to its location next to the new train station, making it likely to be more exposed or even to disappear.

Urban agriculture infrastructure No. 2 (Figure 3.7) belongs to the growing network Odlingsnätverket, is an active allotment garden with approximately 2,749 sqm, where people from around the neighbourhood rent plots where they grow different kinds of herbs and vegetables, it is located outside the study area, however it is important to include because it is the only one in the zone. On the study area, only two allotment gardens are located on the limits, the Rosengårdsfältets Odlimgsomrade, and in the one beside the railway in the south of Törnrosen. Another essential feature to notice about this garden was the active number of plots; only a few of them did not show any kind of activity happening. However, the rest had herbs, salads, beans, and many more, at the moment of the study, it was the most productive agricultural garden.

No. 3 (Figure 3.8) is located in the school Sparvens förskola, and it is only accessible for children. It is three sqm of the crop, placed on the ground level in the garden at the front part of the housing buildings and in between the parking zone. The garden with three pallet boxes for growing vegetables and herbs was not active, and it required management. It is Probably is used to teach children about food and agricultural practices.

Figure (3.6) Image of the community garden located on the Rosengård train station
Figure (3.7) Image of allotment garden close to the railways.
Figure (3.8) Image of the school garden

No. 4 (Figure 3.9) is one of two gardens abandoned. It is located at the surrounding on the green areas in one of the buildings in Örtagården. There is a presence of some work in the pallet boxes, and it was found a fence made of willow branches as at the community garden number 1, this community garden is in one of the most accessible areas in the neighbourhood just in front of the benne's bazaar square, and it is visible from far distances

No. 5 (Figure 3.10) is located on the flower bed at the entrance of one of the buildings in Örtagården courtyards. There were found two pallet boxes in the site and probably only used by the people living in the building. Used for growing herbs and some vegetables.

No. 6 (Figure 3.11) community garden belongs to the förskola Rödklinten and together with Odla I Stad, children use this place to learn about the process of growing vegetables, fruits and herbs. The six boxes have labels with the products growing in them. At the moment, a few examples found were carrots, strawberries and herbs. This is an excellent example of how to combine theory and practise with the children.

No. 7 (Figure 3.12) is one of the biggest in Örtagården. It is located at the entrance of one of the nine-floor buildings in the south of the neighbourhood. The community garden has 17 boxes divided into four green areas along the entrance of the building. In the boxes were found mostly herbs; however, the management of the boxes does not seem to be active at the moment. This might be because of the season and probably the activity will start soon at the end of April. The boxes were double to have them higher from the ground level.

Figure (3.9) Image of an abandoned community garden in bennez baazar square
Figure (3.10) Image of community garden in pallet boxes outside of one of the buildings.
Figure (3.11) Image of school garden with labels in each box.
Figure (3.12) Image of community garden at the entrance of one of the buildings.

No. 8 (Figure 3.13) Yalla Trappa community garden is located on a terrace in front of the building; the flowerbed on a “Y’ and a “T” shape letters referring to the NGO. At the moment, the garden is not active and requires maintenance. Usually, people grow herbs in this garden that later on is used in the kitchen. It is not fenced or sheltered, which makes it very exposed to people passing by, wind, fauna and the flowers beds are not protected.

No. 9 (Figure 3.14) Näckrosens förskola SDF Rosengård, has seven pallet boxes inactive where children can learn about the growing process of food in a practical way. The garden has not been managed in a long time, and the boxes are empty.

No 10 (Figure 3.15)Tengel community garden. An active garden located on the back yard of the Tengel building is a combination of sitting places, flower beds, trees, shrubs and boxes for growing all different kind of herbs, vegetables, etc. This community garden is the most biodiverse and better managed. Even though all those useful features, it not very well located, the street and the building make it have complicated access it by crossing the road where there is no pedestrian crossing, and the other access can be only used throughout the building. This garden was prepared for starting the growing season.

After counting and analysing all the community gardens in the two neighbourhoods, Törnrosen and Örtagården, it was clear that in the second one were found more garden than in the first one, it is unclear the reason of this due to the both have plenty of green areas with a lot of potential of being used as community gardens. We can see on the map for green spaces (Figure 3.4) that both neighbourhoods have approximately the same area of the green areas in-between the building and courtyards.

Figure (3.13) Image of community garden at the entrance of the Yalla Trappa restaurant.
Figure (3.14) Image of the school garden.
Figure (3.15) Image of the Tengel community garden

3.3 THE CULTURE CASBAH PROPOSAL

For these increasing challenges in Malmö, it was released in 2011 a competition for designing a master plan proposal to densify the neighbourhoods of Törnrosen and Örtagården, two of the central neighbourhoods in Rosengård, it is planned to build it in three stages and opened an excellent opportunity to make a more inclusive city in one of the most populated districts in Malmö by immigrants. However, the study made by (Fröjd & Wendel, 2017), analysed the possibility of increasing segratiation on the district due to the design proposal by Lundgaard and Tranberg and, how this proposal is planning to gentrify the area instead of improving the already existing areas for those living in the neighbourhoods. Another critical point to take into account is to diminish the negative image of the district that has been promoting insecurity and segregation through the media.

Increasing the number of houses, among other problems. From the strategic plan, 16 problems were selected related to the site, which involved, design in urban and architectural scale, from the physical barriers to connecting the district to other areas in the city, to the lack of services, in order to increase the job opportunities. The following problems were the most popular, and they consistently appear in the other reports:

1. Insecurity during the night
2. Disconnection with the rest of the city
3. Lack of services and infrastructure
4. Million program
5. Large architectural scale

The program was during a consultation for three months in 2014, in 2013 the Culture Casbah was honoured with the MIPIM Award for the Best Future Project aimed at improving a better quality of life with the design proposal of the tower and master plan for the two neighbourhoods to connect the rest of the city with the district. Stakeholders and residents were included in the planning process by Rosengård Fastigheter, which is a cooperative of four companies; Fastighets AB Balder, Heimstaden AB, MKB Fastighets AB and Victoria Park AB, which are investing and following the process jointly with the Danish architecture firm who won the design competition. The project is located in the heart of Rosengård with the borders with Almiralsgatan in the north, the continental line on the west, streets on the east and the Rosengårds centrum in the south. The master plan is 34 hectares (340, 000 sqm), and it was divided into three parts: buildings, movement and traffic.

The master plan design by Lundgaard & Tranberg Arkitekter (2019) is an urban development that is aiming to reattribute the excellent image that Rosengård used to have before it became seen as a dangerous place and with public health issues. The project focuses on improving the areas by bringing back together with a better architecture design solution that favours the living conditions of the residents and other people visiting the place. The project is divided into five points: urban landmark, variation, edge zones,

Figure (3.16) Master plan proposal of the Lundgaard and Tranberg showing existing and new

sustainability, and human scale, targeting these five points was the aim of the project and base for the design of the master plan. The master plan is planning to densify the two neighbourhoods Törnrosen and Örtagård with new constructions in different scales and forms. Commerce, housing blocks, squares and a 22-storey building are the main developing structures for this project. Using a corridor from the Rosengård train station to the Bennes Bazaar is a combination of new buildings with services on the first floor and dynamic housing architecture on top (MKB Fastighets AB (2011).

The main road, Rosengårdstråket, will be transformed into a promenade, with variation in spaces along the way, as the figure (3.16) shows new buildings would be created to reduce the scale from the modernism architecture of the million programs. One of the main challenges for this project is to reduce the scale into a more human dimension, where the new housing buildings will have between three and nine floors. A variation on the master plan and the tower is a solution in both directions, vertical and horizontal the horizontal distribution of the housing buildings along the Bennets väg street, make room to have small nodes where people can gather for recreation and other activities. Some areas along the street, allow the possibility to integrate community gardens, like the one proposed in the main square.

These buildings are placed in between the existing buildings where there is enough space, filling the gaps in the courtyards. The buildings are three storeys to recover the

human scale. Most of the existing it made an intervention to connect the front buildings with the courtyard by building a terrace in front of the apartment, which will enhance the relation from private to semi-private. In the case of the new buildings, it is easier to plan those edges, however for those existing building the connection to the courtyard would require many modifications on the design due to the balconies are in some cases one meter higher than the grounds level and in other cases, the gap is filled with flower beds. One of the most crucial interventions on the site is the underpass, which was removed to keep the pedestrian, cycle road and roads in the ground level. The junction would be transformed into a square, allowing interaction between all kinds of transportation systems.

Figure (3.17) Image of some of the buildings with 1 meter distance from the ground level.

One of the most significant conflicts is the accessibility to the area and traffic in the neighbourhood. For the case of Törnrosen and Örtagården, the two neighbourhoods are delimited by psychical barriers affecting the connectivity with another part of the city due to the structured urban planning with mono-function architecture, in this case, the housing units. An example for these physical barriers is the city railway on the west part of Rosengård, the limited under passages feel unsafe, and only a limited amount of people use them, in some cases, people rather face the dangerous traffic on the road instead of the pedestrian and cycle passage. The railway is elevated on an embankment, which encloses the neighbourhoods and the only connections are not well designed. Connection of existing traffic with the new one, to make more direct access to the neighbourhood it will reduce the width of the roads approximately to 17 m with sharing areas for cars, bikes and pedestrians, rebuilt streets, add new infrastructure, and add target points for designing.

One of the features to consider on the master plan was the herb garden, which is adjacent to the square, the garden is not explained in detail, or who will run the management, if it is an allotment garden, or what kind of urban agriculture infrastructure. The herb garden square is further strengthened and defined by new buildings adjacent to the square. With new buildings, a higher functional variation can be created than there is today. The public spaces of the buildings should be visible from the square.

Törnrosen tower is the central urban landmark to this project. The tower structure is planned to have multi-purpose use and activities. On the ground floor, it will have a coffee shop and outdoor seating. On the following floors, different services will take place, library, offices, music hall, hotel, hostel, student housing, party hall, restaurant and green roof terrace. The building gathers green areas on the roof, public places in-between the floors like terraces, and the base of the building. Trees are spread on all the terraces in the building.

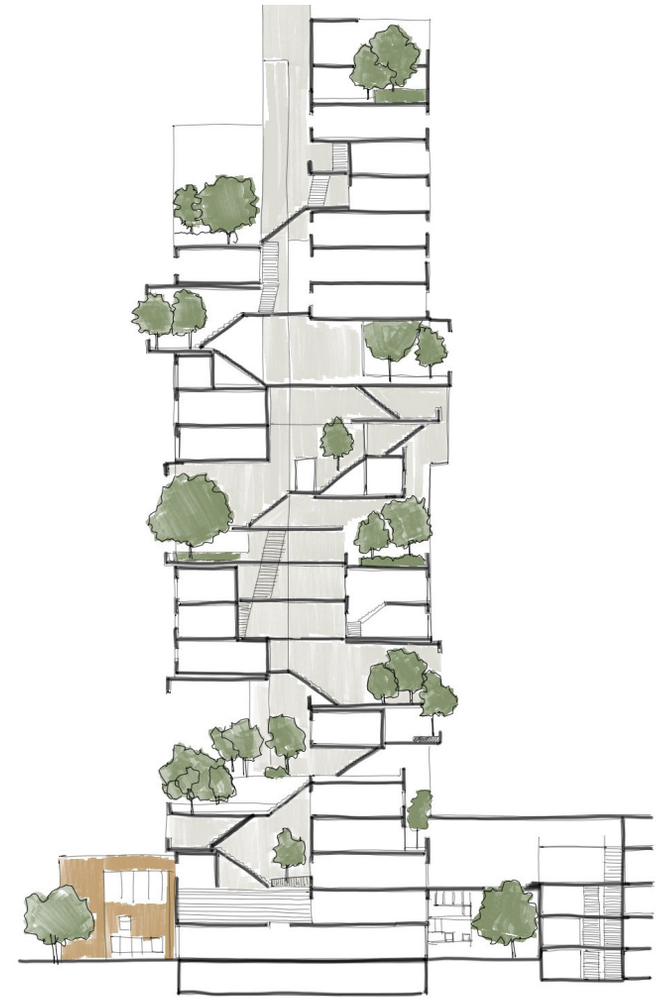


Figure (3.18) Sketches showing the tower section, perspective of tower.

The project is aiming to have public and private areas, of which the public one is located on the first floor, and the private ones were on top. The design solution was based on housing a variety of scales and shapes to bring a more dynamic interaction between people and buildings in Rosengård. The vertical circulations, stairs and lifts, connect the terraces entirely, allowing a continuous circulation in the building (Lundgaard & Tranberg Arkitekter, 2019).

Densification developments provide housing and services to the people moving into urban settlements in Sweden and for the City of Malmö with an already multi-cultural base develop society. The local authorities are looking to densify the districts of Rosengård with four basic principles: Sustainable, human scale, variation and edge zones (MKB Fastighets AB, 2011). Aiming for a more compact city could facilitate the expansion of already existing services and infrastructure in the cities. The municipality of Malmö is conscious about this densification road that cities around the world are taking. Without exception, planners and stakeholders can see the benefit of densifying districts like Rosengård. (Malmö City Planning Office, 2014).

Figure (3.19) Sketches showing the visualisation of the Danish company Lundgaard and Tranberg.

Figure (3.20) Sketches showing the elevation of the tower and the buildings along the pedestrian corridor.

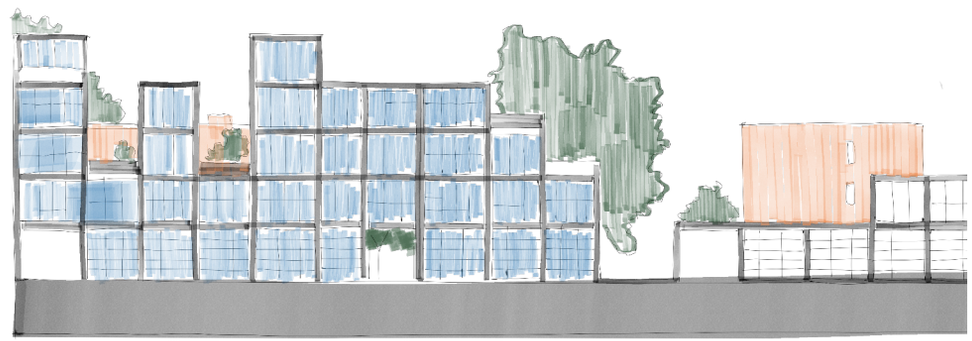


Figure (3.21) Sketches showing the elevation of the houses and commercial areas in the corridor.

SECTION IV

4.0 DESIGN PROPOSALS

In order to understand how the design solutions work, it is important to clarify the essential components of conventional farming (see image 2.7). Traditional farming to requires, sunlight, a land, soil in right conditions, water from rain or irrigations systems, seed, farmers, synthetic chemicals like pesticides or fertilisers and machinery to harvest larger amounts efficiently, these are the basic elements of a conventional farming model. Still, there are different kinds, for example could be organic or intensive, based on land or in water bodies. Then indoor agriculture (greenhouse) which is isolated from the outdoors having a more controlled environment to prevent the agents that could affect the crops. In most cases requires artificial lightning, could be based on the ground or in pots, soil, and water through irrigation systems, the seeds plus nutrients, in fact, that is a hydroponics kind, fewer farmers and some specialised machinery to keep the best conditions for the crops. Four design solutions were made to be used in the proposal for the Törnrosen tower and the urban plan. Indoor farming, which refers to all kinds of greenhouses, raised bed are flower bed based on a structure for example pallet boxes to separate the soil from the ground and finally hydroponics which could also be located both indoor and outdoor.

4.1 DESIGN SOLUTIONS

The design solutions were thought for those professionals involved in the design process for building green infrastructures, architects, engineers, interior designers, to have a practical understanding of the urban applications of agricultural infrastructure in housing building, The following diagram shows how the proposals for the Culture Casbah was obtained. Then each of the solutions was based on the urban agriculture infrastructures; Green walls, Greenhouse, risen bed or pallet boxes, Hydroponics, Conventional farming, Floating Gardens and Aquaponics. These types were categorised by six concepts:

- Materials, all the basic elements needed for growing food.
- Orientation (horizontal for traditional solutions or vertical for walls, this helps to understand how the plants will grow
- Location, the Culture Casbah has public and private areas from the entrance to the roof.
- Users: (private, public and biodiversity for those areas just for biodiversity support
- Forms refer to the standard presentations coming from factories and providers.
- Vegetation System which are the seven layers of ideal forest garden

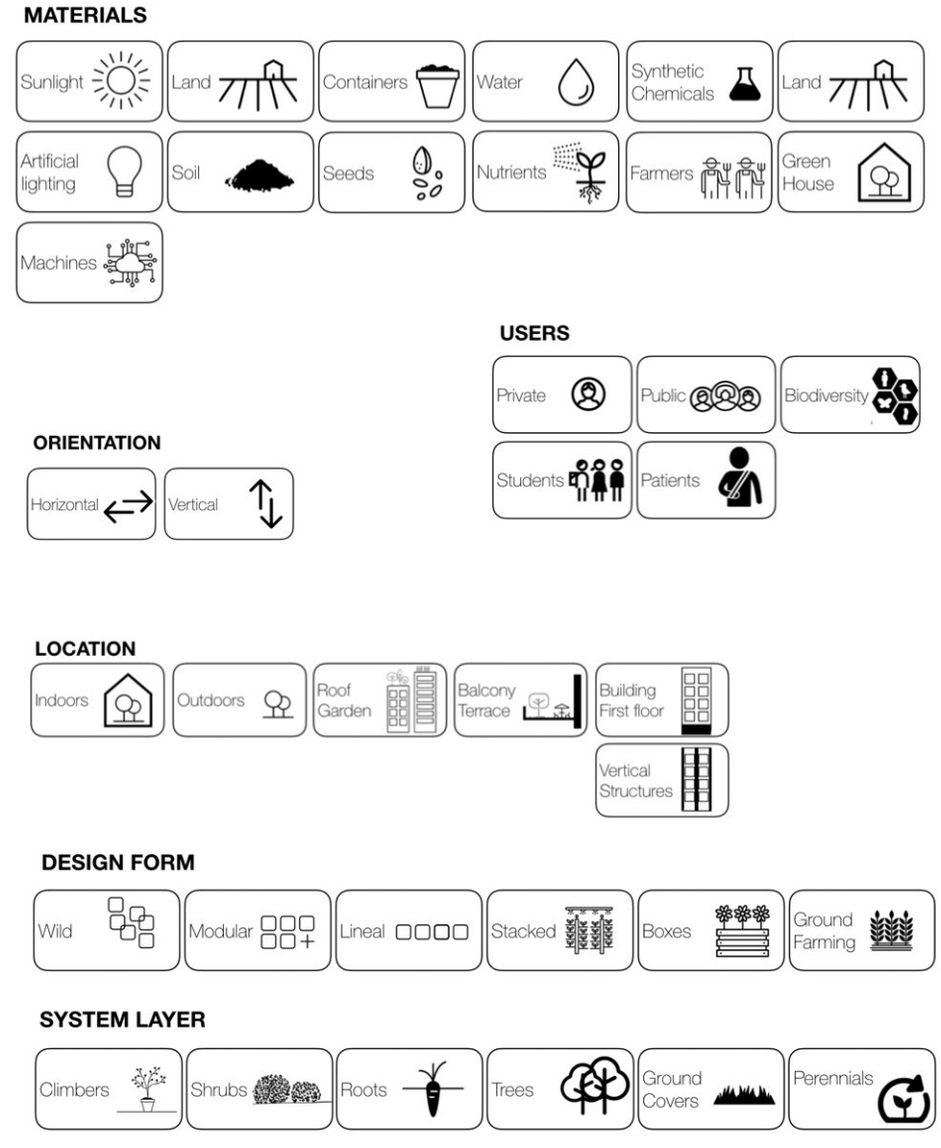


Figure (4.0) Diagram showing an example of the design solution, applied in the tower proposal.

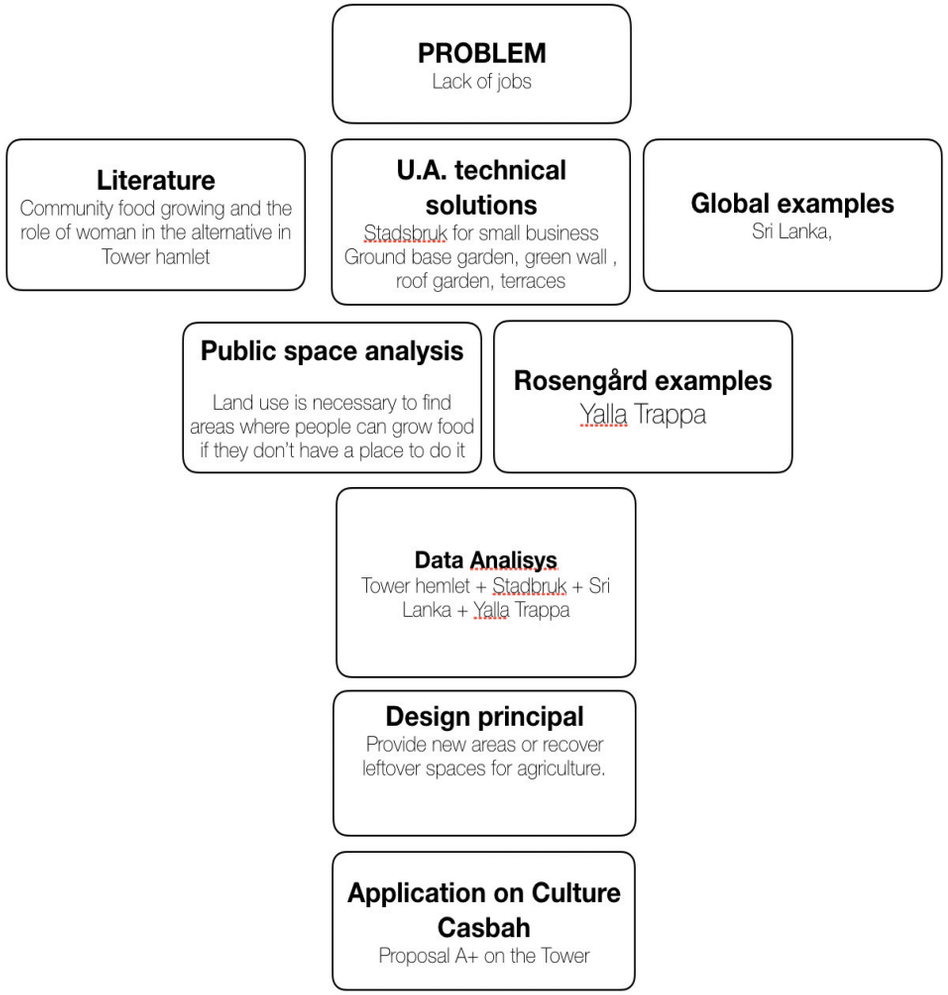


Figure (4.1) Diagram showing an example of the design solution, applied in the tower proposal.

4.2 COMMUNITY GARDEN PROPOSALS

MASTER PLAN

On the urban plan, the main changes made were; adding small community garden designated areas. The suggestion for urban agriculture infrastructure was based on creating a network of green spaces, and with the help of the site analysis, the existing gardens in the area prevail, and some others were added. Each of the gardens has a specific function on an urban scale which cannot be isolated from the tower green infrastructure proposals, all of the gardens are part of the integrated model of green corridors to build an urban ecology infrastructure in favour of people and nature. On the figure (4.2) are highlighted the strategic locations for the urban agriculture infrastructure, to enhance green corridors in the neighbourhoods.

A.School Garden: By using the existing garden, it was designed and improved the space for teaching children the growing process of the food. Children will learn to grow and, in the harvest, will consume the products. The garden will have three boxes that would be improved, adding labels to identify the food, a storage box will be added to place with a table where the children will collect and store all things necessaries for the garden. On the fence shrubs, perennials and climbers will add shelter for noise, pollution, wind and to will increase the biodiversity for pollinators. It is necessary to manage the gardens, and frequently the help from a gardener will need it to keep the crops healthy. During holiday time, a volunteer from the building could develop this work.Inspired by Botildenborg school gardens.

B.Green wall + Community garden: Törnrosen for connecting green corridors. Open for public and residents it is located in a sheltered area, and during the winter it will be partly shaded. However, orientation favours the crops, and it will be improved by adding a suitable variety of species, it is ground-based and optimal for ground covers, trees and root systems. The land will be clean, and a fence will be needed, even though the area is protected from wind, it is a node for accessing buildings and green space. The main challenge of the garden is to create a group of volunteers to manage the garden, MKB could help with management, stormwater management infrastructure and provide materials for growing. Benefits are the prevention of flooding and temperature regulation. Inspired by “The greenest of the green”

Ço.Community garden: located in the flower bed at the entrance of a building in Örtagården courtyards. Visible and open can support small crops. It is based on pallet boxes and has access to water from the housing building. The garden is for public use, and people from around the area could join the practice. Improve social interactions. Food production is not the goal but to create community and to encourage physical activity for people that can move quickly. Inspired by Enskifteshagens.

D.Rehab community garden: The garden is designed especially for patients in treatment. The garden is located in a courtyard to create a shelter from noise, movements and disruptions happening in the area. This garden will be optimised to have been a greenhouse during the winter. Using materials to retain heat and protect from rain, snow or wind. Inspired by Alnarp’s Rehab garden.

E. Community garden + NGO: This organisation will be the operation centre for all of the urban agriculture gardens, it is important to have people with experience involved into the practice, even though growth is not a complicated work, the management of areas, supply of materials and services to keep running all the places is not that easy. The community would organise activities workshops and meetings in relation to urban agriculture. Inspired by Botildenborg.

F.Large Allotment garden: This large garden is located on a busy path that locals use for walking to the bus stop. Almiralsgatan is close by making it a noise area but also makes it easier to access. The allotment is a good solution for building green infrastructure. Frequently the allotments gardens are places where the most active gardeners take place, and it is necessary to have efficient management of garden for this location, due to the surrounding infrastructure. It has good access from other districts. The site will have storage, fences and infrastructure to provide the necessary elements for growing food. It will benefit the gardeners and also people passing by through to garden to get in the bus stop. Inspired by Allotment gardens in Rosengård

G.School Garden 2: This already existing garden, for teaching about agriculture, requires support from the municipality to provide raw materials and tools to improve the condition of the crops. The boxes and the management are good enough to motivate children on agricultural practices. (Design solution in Appendix) Inspired by Botildenborg school garden.

H.Törnrosen Tower: The centre of the master plan and of all the community gardens, even though the tower gathers most of the crops inside the building, the green infrastructure also connects to the green areas at the entrance and surroundings. Inspired by “The Greenest of the Green” and Vertical Forest.

Figure (4.2) Analysis of master plan and proposal for the urban agriculture infrastructure.

After harvest, the local producers will have the opportunity to offer their products to reinforce the agriculture community, socially, economically with two markets on wheels operating a couple of days on the week. These markets one for each neighbourhood are planned for selling or exchanging local products to the residents from the area and also from those coming from another part of the city. The Törnrosen tower proposal is a multifunctional building for increasing the social activities through having a mixed-use in the building. The public areas enhance interactions between residents and visitors. However, none of the green spaces is designed for urban agriculture, all of them are designed for aesthetics.

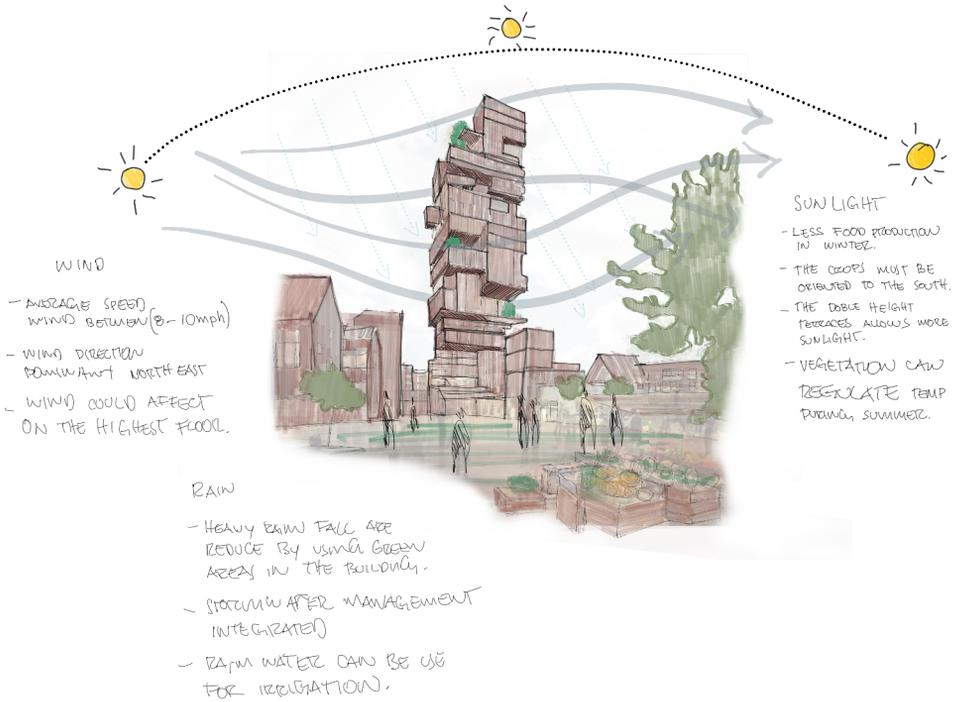


Figure (4.3) Analysis of tower showing the weather events that could influence on the gardens.

TOWER

For the tower proposal, four areas on the tower were selected and named A,B,C and D and the proposals using urban agriculture were names the same adding a + symbol to identify them in analysis tables.

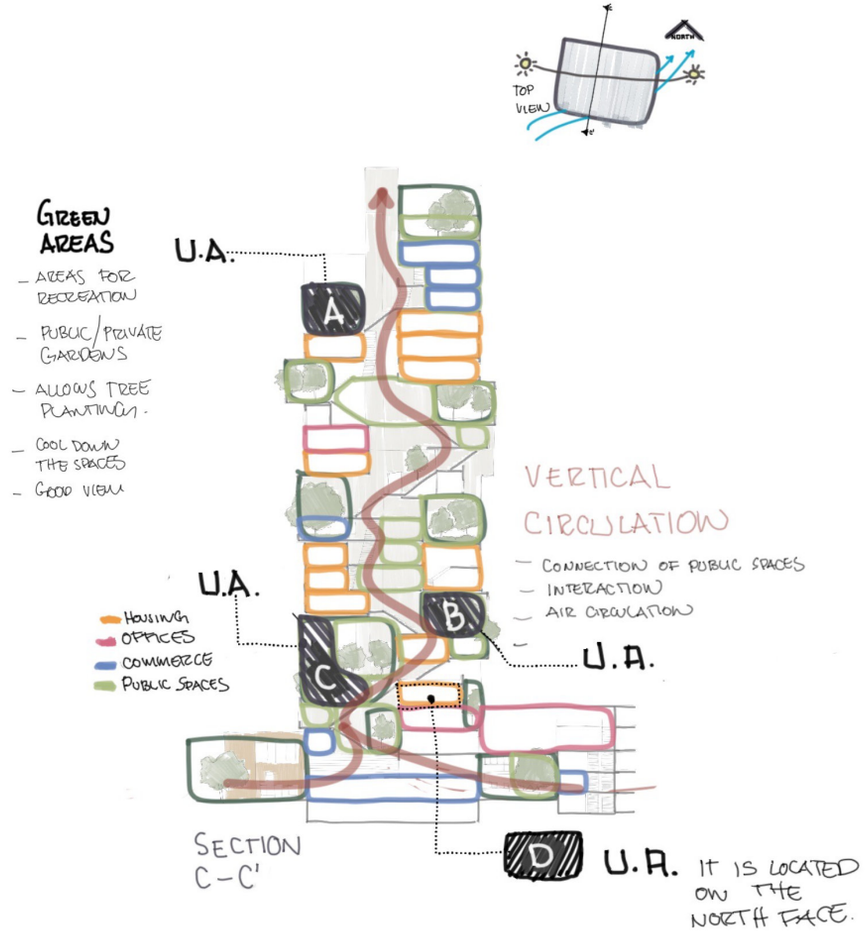


Figure (4.4) Analysis of the green areas, circulations, private and public areas.

Proposal A+ community garden located on the rooftop is a series of raised beds private and public. In the private garden, the seven-flower beds are designed to grow perennials, roots, climbers, products that could be used frequently in the kitchen like herbs and beans. Space is a social terrace with furniture to sit. The green wall is a heat regulator for the direct sunlight heating the wall. The terrace is also water storage for irrigation in the lower floors, it is located as water mirrors, and the drainage goes down in the vertical ducts sharing with the other water systems. Benefits include social interaction, climate change mitigation, and wellbeing through physical activities and greenery aesthetics to connect with nature

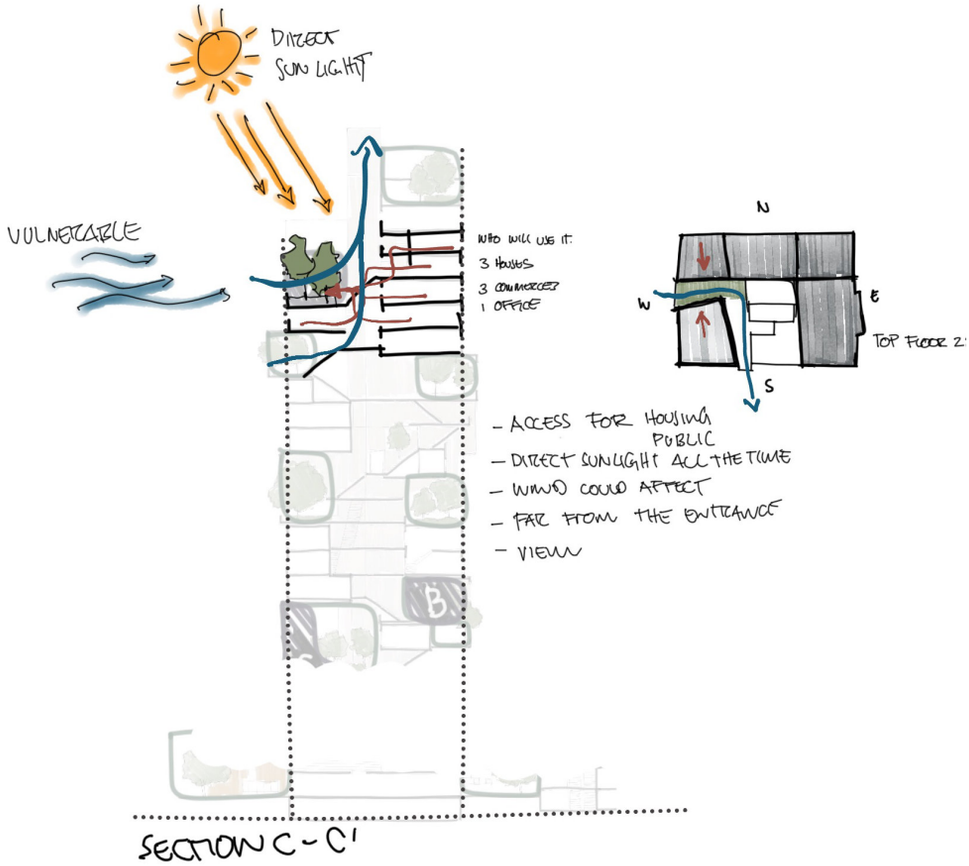
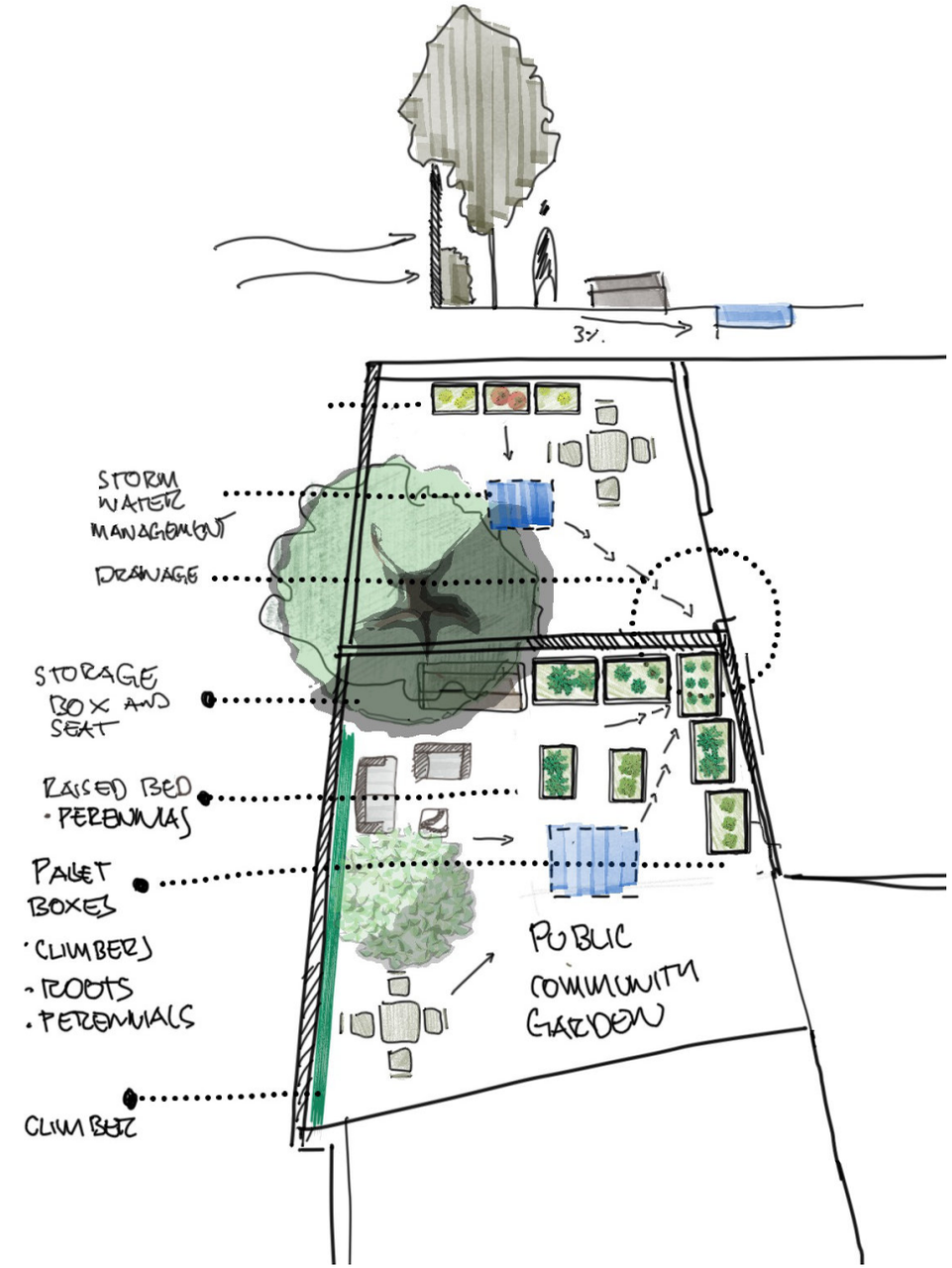


Figure (4.5) Section drawing of the proposal A+
Figure (4.6) Top view drawing of the Proposal A+



Proposal B+ community garden located on the ninth floor is for social interaction. The

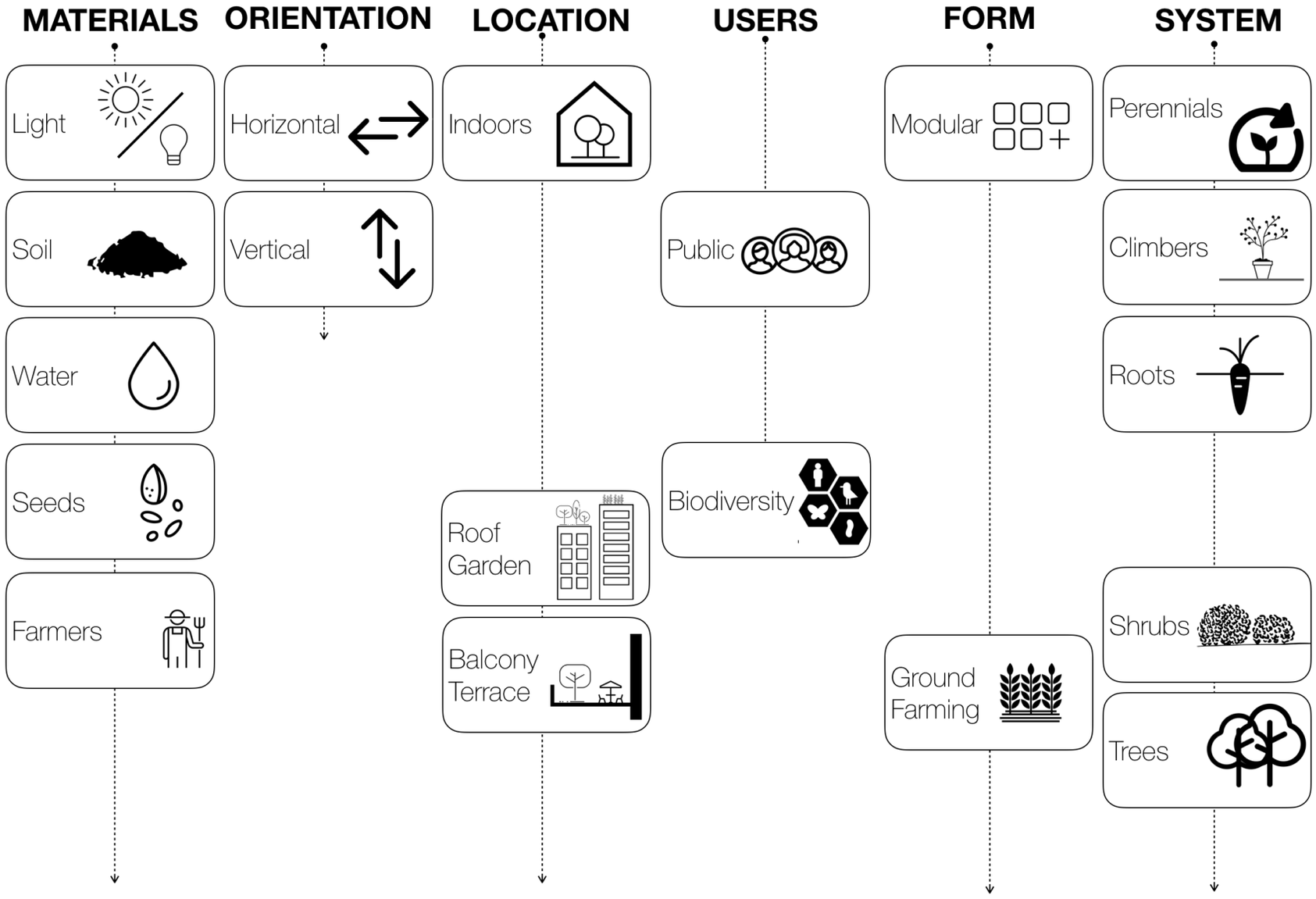


Figure (4.7) Design solution from toolbox for the A+ proposal

garden is on raised beds (boxes) to grow roots, perennials, and shrubs. The garden has, storage boxes, to collect tools and materials needed for the crops, it also works as a table, and there is a special container for compost. The drainage has to be adapted on the façade due to the distance to the closer system is too far, and it would increase the cost significantly as there are other terraces in lower and higher floors. The climbers from the lower terrace connect through climber supports. On the wall, some modular pots complement the biodiversity to attract pollinators

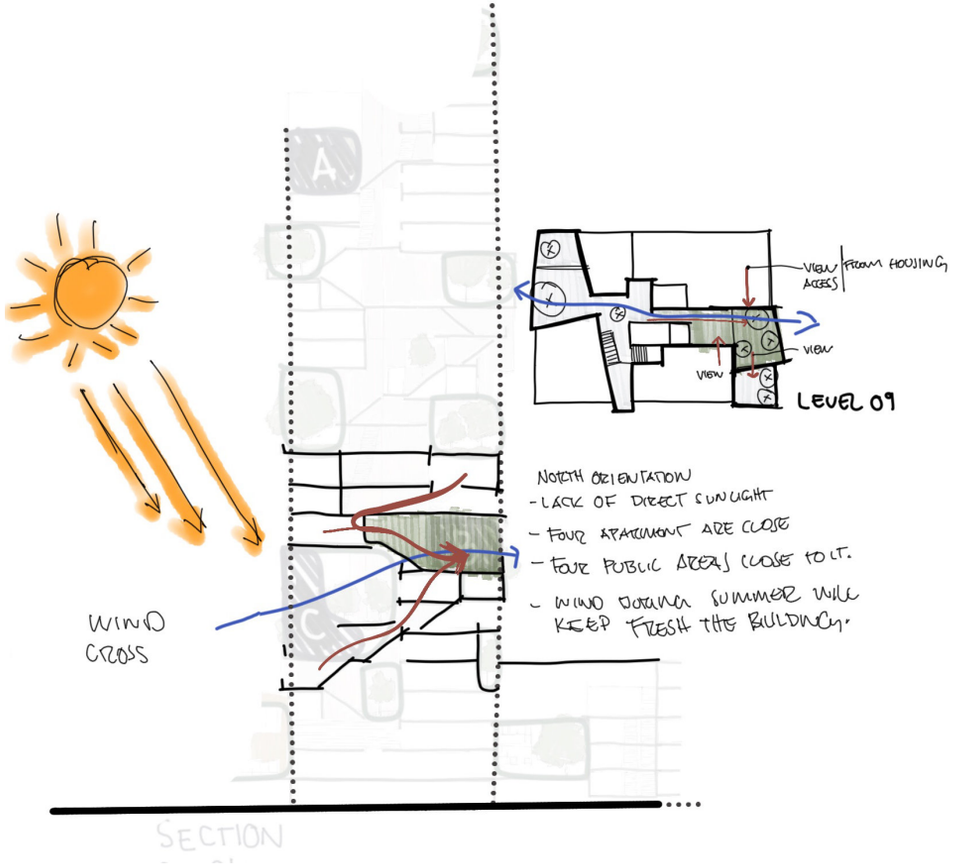


Figure (4.8) Section drawing of the proposal B+

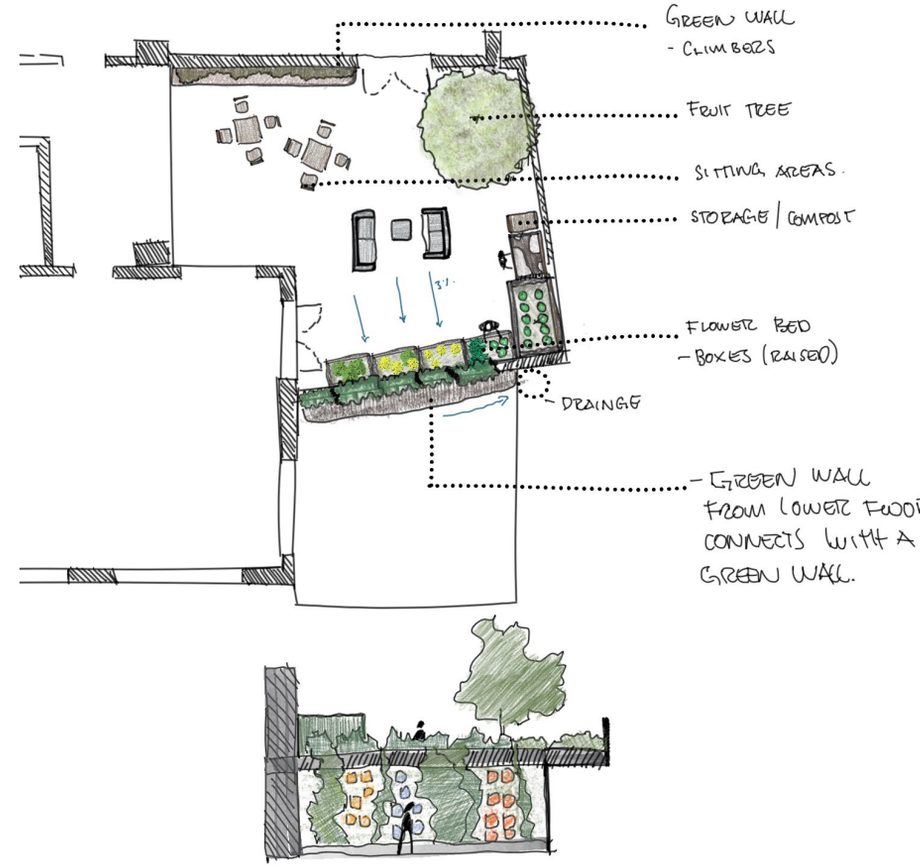


Figure (4.9) Top view drawing of the proposal B+

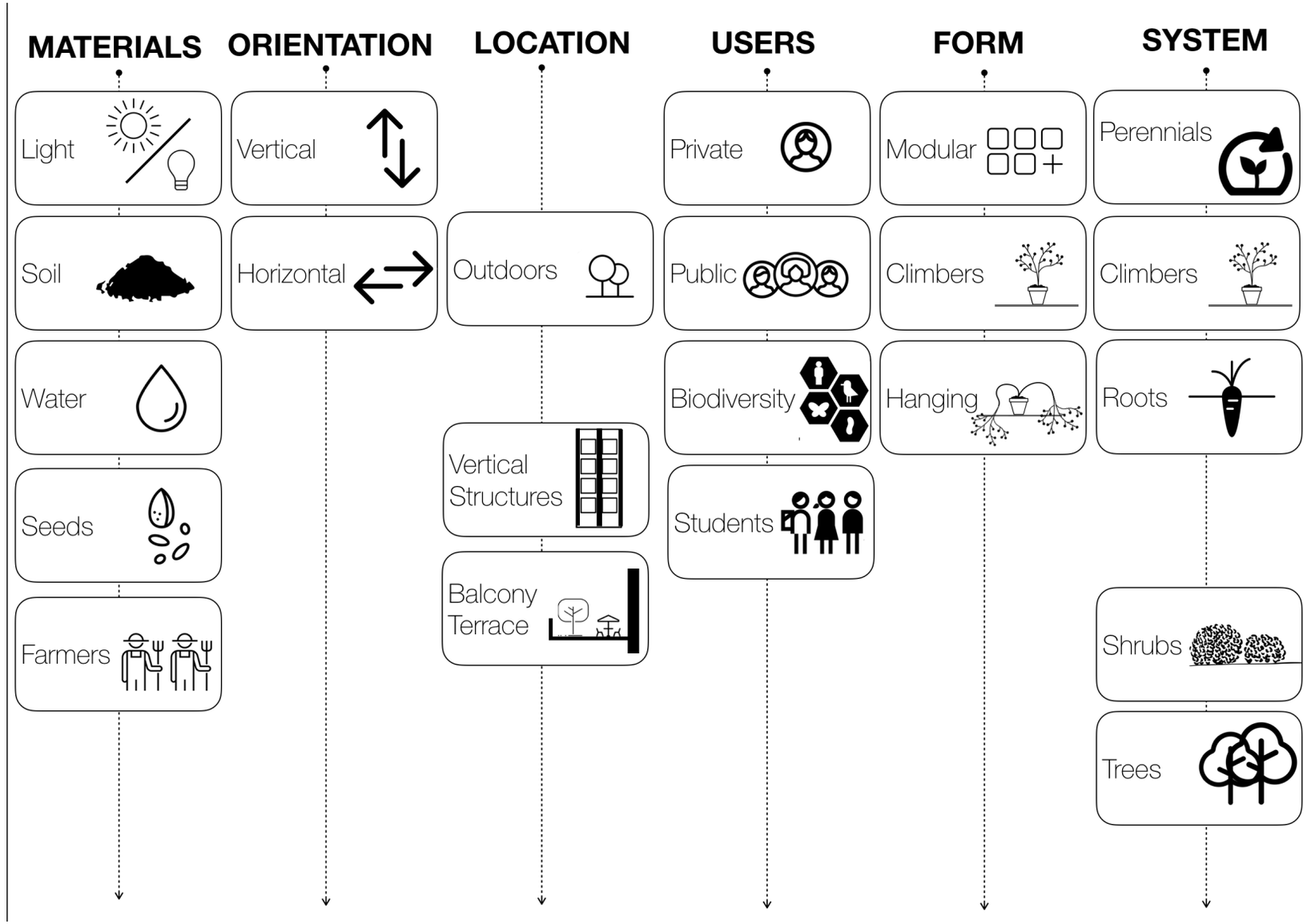


Figure (4.10) Design solution from toolbox for the B+ proposal .

Proposal C+ is a terrace composed of three areas, in which all of them have lower intervention in the structure of the building. The garden “Open view”, is designed to have shrubs and ground cover, most of them small plants to allow people to see the view. It will create shelter for those people looking for a calm place in the building, and it is open for most residents. The “Corridor” is a small terrace that supports biodiversity by using hanging plants and climbers to connect the green areas. It only supports biodiversity, and it is protected from people due to the location. The terrace “Lotto” will be used for activities like yoga or meditation, the purpose of this place is to have access to smell, flavour and textures. The species vary from berries, herbs and fruit trees that could improve the state of mediation of the visitors. All these gardens are adapted to the structure and using a system of green roofs with seven layers of materials that keep moisture or water filtrations. The following image shows the layers and thickness of the elements necessary to include in the structural design.

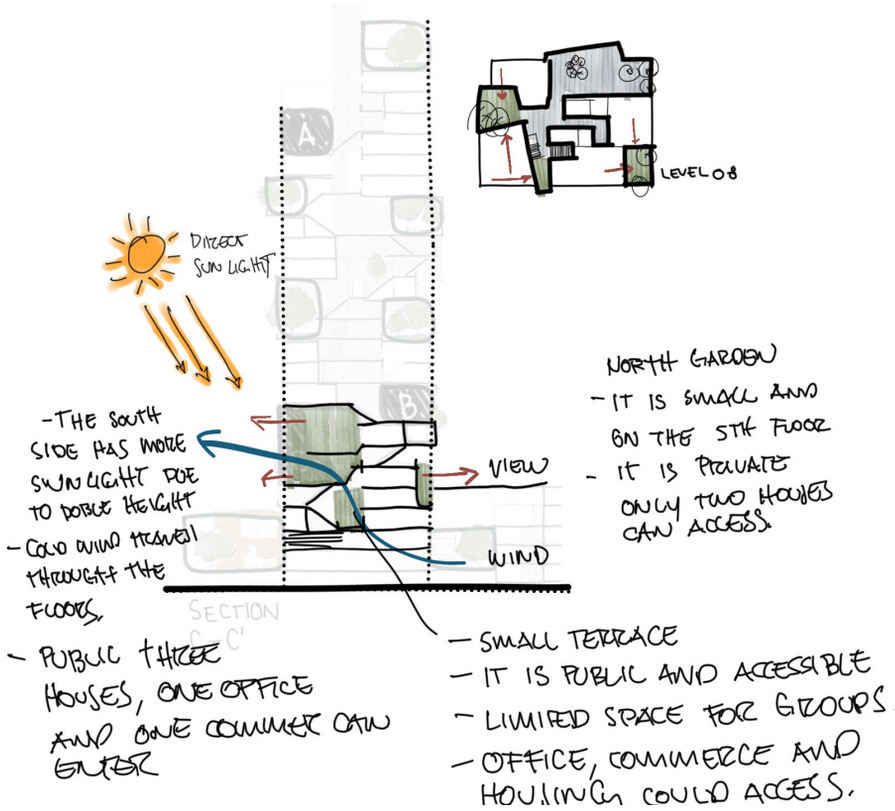


Figure (4.11) Section drawing of the proposal C+

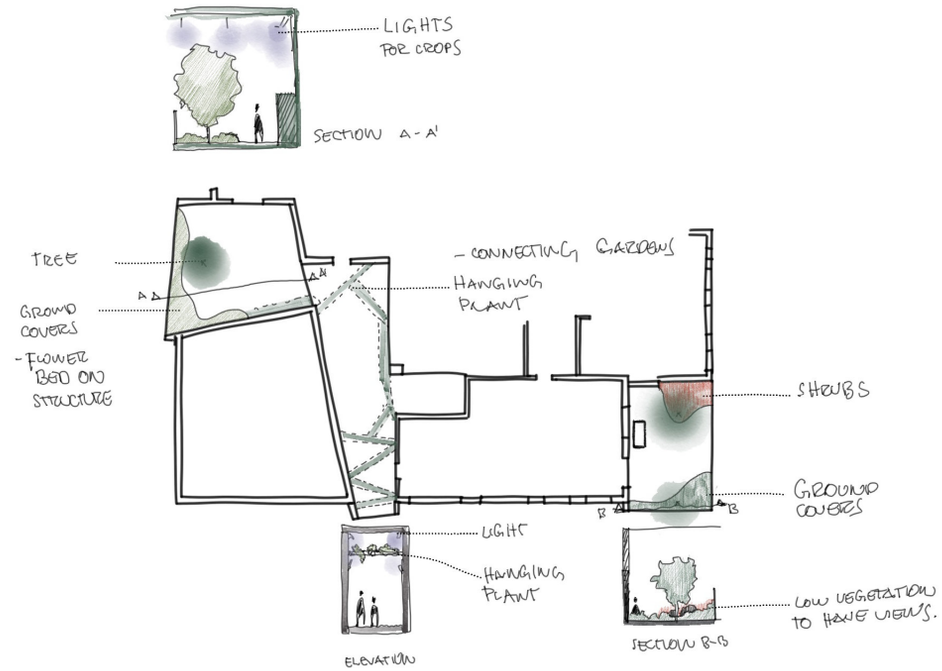


Figure (4.12) Top view and sections drawings of the proposal C+

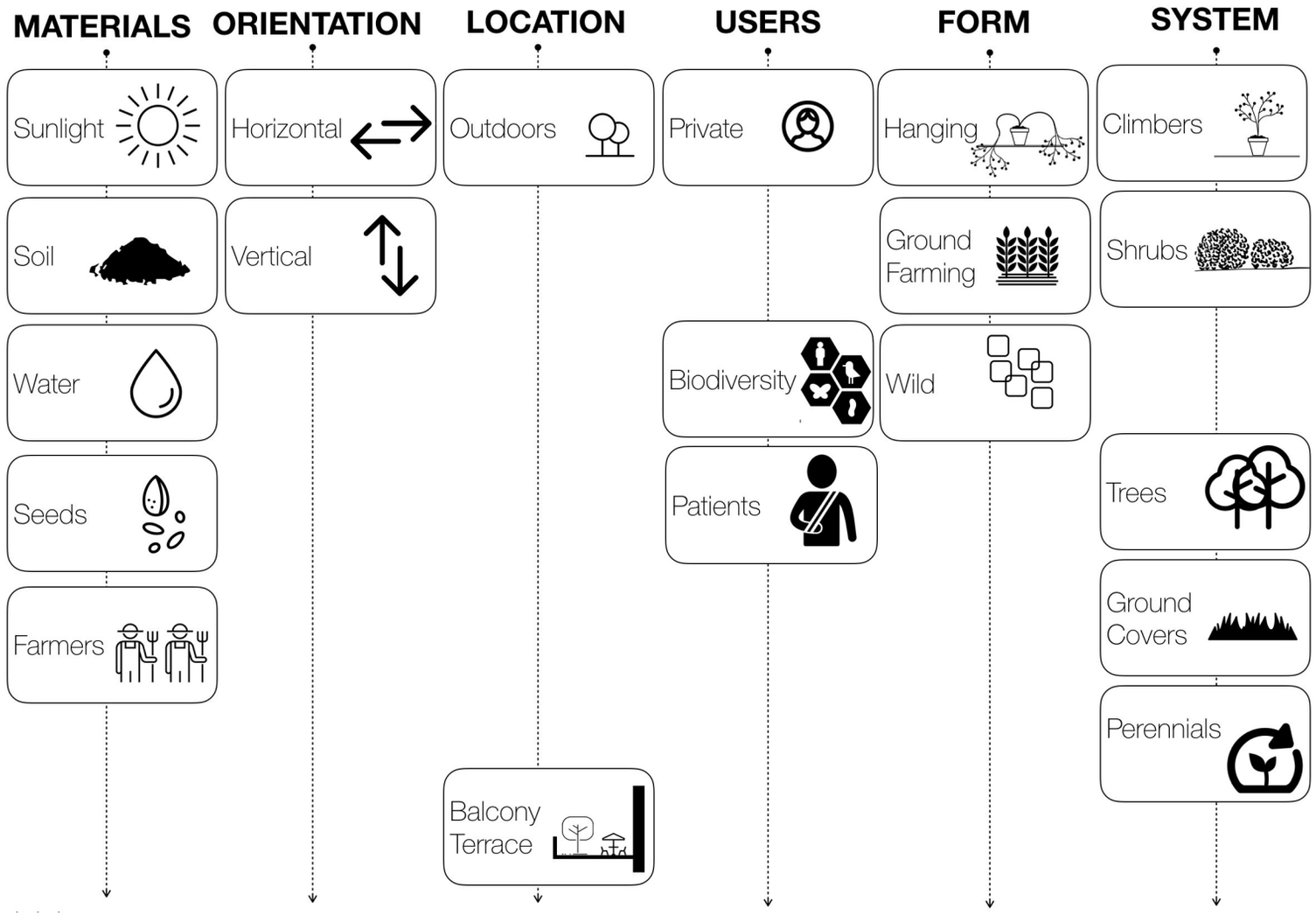


Figure (4.13) Design solution from toolbox for the C+ proposal .

Proposal D+, the mini greenhouse, was specially designed for a north orientation which makes it complicated to grow any food. However, the area is sufficient to gather crystal boxes to small plants that could be used in other gardens or to grow salads. It was also included a system for controlling the conditions of the ambient temperature in the boxes to have the perfect conditions. This area requires more infrastructure and could be possible the smallest area for interactions. It is still essential for those living close and suitable for those looking for a business model.

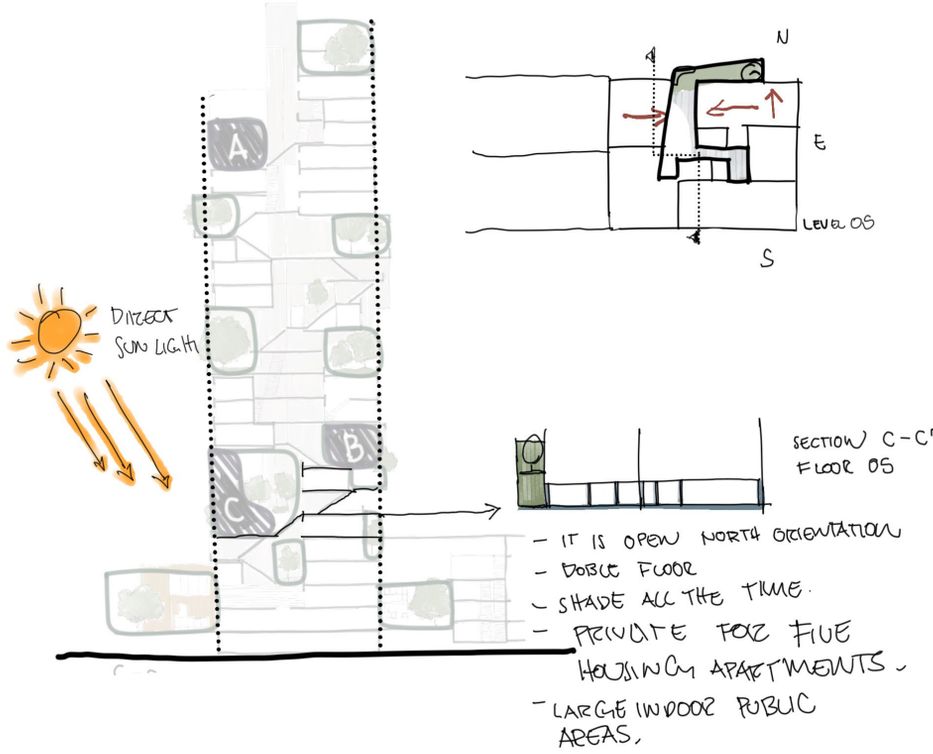


Figure (4.14) Section drawing of the proposal D+

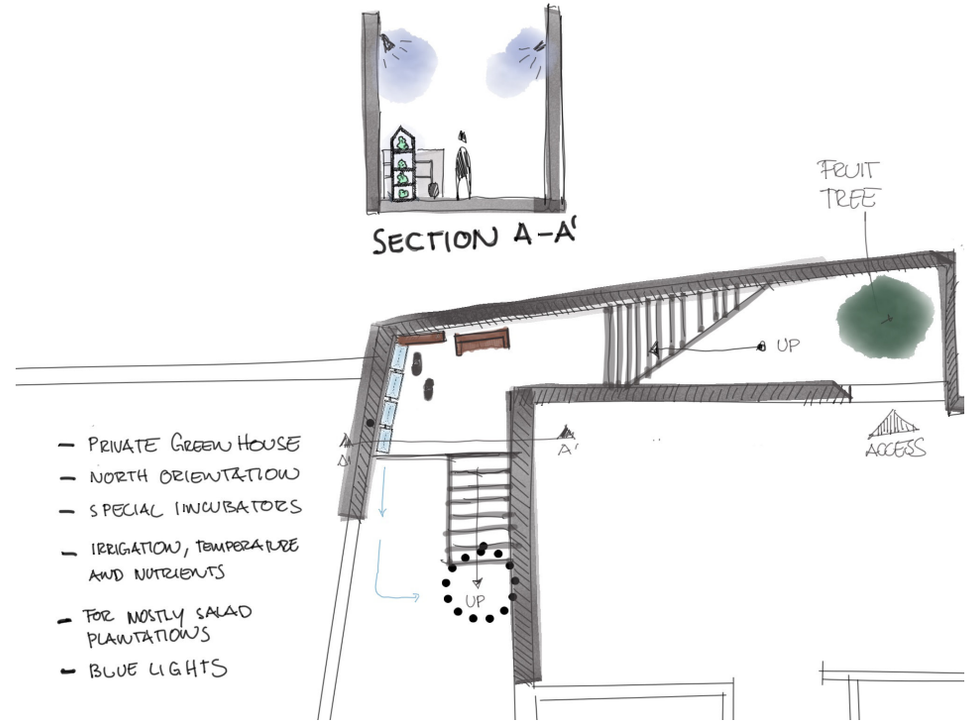


Figure (4.15) Top view drawing and section of the proposal D+

4.3 DATA ANALYSIS

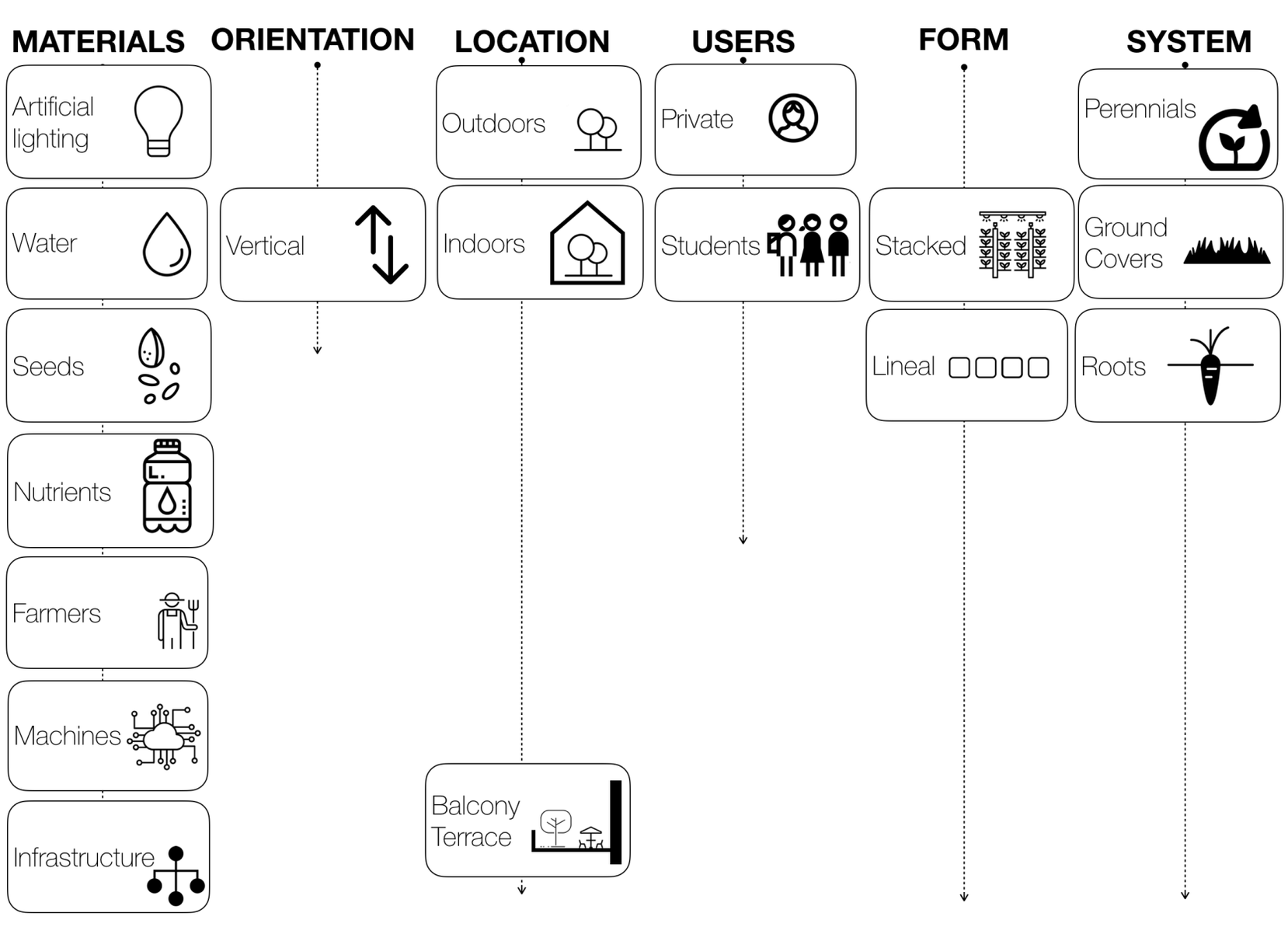


Figure (4.16) Design solution from toolbox for the D+ proposal.

The data and information collected from section one: introduction, two: literature review and three: the case study, were integrated into the following chart (4.17) using six categories to combine the date and conclude with an example of how U.A could be used to improve or increase the problems in the study case. The table for the data analysis is divided into six categories; each of them explored the problems, recommendations, and design solutions on an urban scale and for the tower. The first category is the state of the problem described in section one, which refers to global and local challenges in urban settlements. The second category is the recommendation from the strategy plans from the municipality and official documents from the (UN-HABITAT, 2016) Toolkits and literature review. The third is the urban planning proposal from the Danish architecture firm divided into the master plan that includes the study of the two neighbourhoods Törnrosen and Örtagården and the multi-function tower, which focused on the building specifically. The fourth category is the goals that were taken from municipal strategies and literature review. The fifth category is the interpretation of the previous categories translated into a more simplified example. The sixth category is urban gardens solutions in terms of how the previous categories could fit in the U.A. The last category is an example of how this different category could be gathered and integrated into the design principal in a specific example applied on the case study of the Culture Casbah.

On the urban planning, table were found contradictions, for example, breaking down barriers in Rosengård is evident however the only physical barrier stopping pedestrians was to level the under passage for bikes and pedestrians, make it easier to cross it on a ground level. However, it is questionable if it will be efficient to have cars, bicycles and pedestrians on the same road the other intervention are two new roads for cars. The transition between public and private is another contradiction on the planning scale, most of the buildings for the construction stage three will close the access to the courtyards, transforming the semi-public into private instead of on the other way around.

The navigation in Örtagården is more open and vaster. Large areas of lawn allow users to find locations easily, yet, the green areas are missing biodiversity to enrich the public spaces. See image (3.7). In the clustered courtyards, the feeling of privacy is more present, and the locals have an active community that is not easy to break as a visitor. The variety of species is wider in those places. Community gardens are spread along with the buildings, and it is a more active neighbourhood in terms of food production. Due to the urban densification, the new development puts a risk to have a more open inclusion in the new courtyards, closing the access to the garden would make stronger communities but isolated from each other. In the case of green areas, it is pointed out several times in the competition documents the lack of green spaces on the site. However, in the Gehl strategic plan, it is not mentioned green areas specifically, only the lack of areas for doing physical or recreational activities. This information was corroborated with the site analysis, and the evidence of green areas in the district is abundant, and most of the buildings have flower beds, gardens, trees and other sources of green infrastructure which is contradicting the competition documents by (MKB, and Gehl Architects ApS. 2011). The Törnrosen tower is planning to be a landmark to attract all kinds of people to the district. However, the services, commerce and offices in the tower are limited in comparison to the apartments. What is going to attract people to the area will be the new small buildings located along the promenade which have services on the first floor and housing in the next two levels. Another problem is accessibility. The main attractions of the building are the public areas connected by stairs between the storeys which would affect significantly the vulnerable users that have a complication with stairs, even though the lifts can reduce the problem the primary experience of enjoying the terraces lays on access by stairs. The tower has a large number of public areas with gardens which will demand management, favouring the job offer, but also increasing the prices to pay for renting an apartment, which could be high even though the building will be energy efficient. Only people with enough resources will be able to afford to live in the tower.

Raking goes from one to three in which three represents the highest score and one the

	ORIGIN OF THE PROBLEM	RECOMMENDATION	URBAN PLAN	GOALS	URBAN AGRICULTURE INTERPRETATION	URBAN GARDEN	
Source	Competition	Gehl Strategic plan for Malmö	Lundgaard and Tranberg desing	Gehl Strategic plan for Malmö	Design	Design Solution	
1	The existing psychical barriers, segregate the district	Break down Psychical barriers: Industry, railway, big traffic roads, cars have hierarchy over pedestrians.	The pedestrian and bike road under passage to ground leve	Landmark to attract all kind of people from different parts of Malmö.	Transform barriers into crops (industrial areas into gardens)	Change industrial sites into garden and public places	S
2	Nodes between transportation systems are not clear	Create links between transportations	The only modification the crossing in the street Västra kattarspvägen and Örtagårdstorget	Easier connection between bus and train stations	Green corridors	Allotment garden E is a rehabilitation of lawn into a series of crops	E
3	The existing centre lacks services and functions	Create a Centre	The proposal have many options for restaurants, culture, shopping, etc.	Square for everyone, including kids	Include fruit trees	The markets proposal enhances the actives in the centre of each neighbourhood	M
4	Lack of attractions	Landmark to attract people	Cultural tower, commerce and hostels coffee shops	Attract people to the district	Local food production to attract people	Corridors, Markets and community social centre	M
5	No transition between private and public	Create a clear boundary between public and private	Yards on existing buildings	Create a variety housing building typographic	Green, roofs and terraces	-	
6	Limited access points	-More access points and entrances	It is expected o enclose access where there are entrances at this point	Improve the accessibility to the district	-	Clustered urban type	Bu
7	There is not visual connection between buildings and roads	Open up views to buildings	The housing buildings have more connection due to the high of the buildings and open balconies	Human scale buildings	Incorporate grading on buildings to connect with nature	All the green terraces reduce the scale into a more human one.	Bu
8	Lightning is not enough	Lighting in roads	The proposal has some lighting proposals	A safe Place	Community gardens help to create community for safety	-	-
9	Traffic s limited to some areas	-Connect existing roads with new one's -Link important sites and destinations	New roads	Have a mix used of streets where cars, people and bicycles are together	-	Two new streets connect the main promenade with vegetation on the sides	S
10	No enough services and shops	Commercial base	Enough services on first floor in buildings	Create a 24 hours area	Active centre during the afterwork hours and weekends	Community centre	Co
11	The roads and areas need a better signs	Increase knowledge about the area	Information not found	Improve navigation in the district	Include signs to locate growing communities City tour of growing gardens	Community centre	Co
12	Housing buildings are too high and is hard to navigate	Change scale	Human scale apart from the tower	Better Architectural aesthetic	Green buildings are dynamic and seasonal	Terraces on buildings along the promenade	Bu
13	Need of housing	Densify the area Define zones in between and create readable outdoor spaces	Housing is provided Fulfilled gaps with housing buildings	Increase the number of houses	Include gardens for social interactions and wellbeing	Front gardens in the courtyards are left to the residents to use them for gardening	Bu
14	Mono functional	Diversification or multi-functionality	More dynamic design	Dynamic architectural design	Green terraces and improved courtyards	Community garden B	B
15	Lack of jobs	Multifunctional to provide services	Commerce in the new buildings	More jobs in the areas due to the shops, services and more attractions.	Working places = more jobs	Selling food on markets could improve the economy and makes more jobs	M
16	Bad image on media	Strong identity	New buildings	Use NGO for the identity. Yallatrappa, Zlatan football court, multicultural approach	Gardening in Yallatrappa	Product exchange with other communities in the district. Allotment garden E	E

Figure (4.17) Table with problems recommendations for the urban planning in Rosengård district. Includes the interpretation of the problems in the urban agriculture context. See appendix for bigger size.

	ORIGIN OF THE PROBLEM	RECOMMENDATION	TÖRNROSEN TOWER	GOALS	URBAN AGRICULTURE INTERPRETATION	URBAN GARDEN	
Source	Gehl Strategic plan for Malmö	Gehl Strategic plan for Malmö	Lundgaard and Tranberg desing	Gehl Strategic plan for Malmö	Interpretation of the previews columns into urban agriculture	Design solution	
1	The existing psychical barriers, segregate the district	Breaking down psychical barriers	Access to the services will be harder compared to a more horizontal solution.	Break down psychical barriers	Transform barriers into food corridors	Vertical circulations with green areas for food or supportive biodiversity	VC
3	The existing centre lacks services and functions	Create a Centre	The tower gathers services and functions	Square for everyone, including kids	Public community gardens accessible	Community garden A and C are open	A,C
4	Lack of attractions	Landmark to attract people	Tower with multiple services	The tower will be a landmark	Public areas could include urban agriculture	Community garden A	A
5	No transition between private and public	Create a clear boundary between public and private	Public and private accessibility	Create a variety housing building typographic	Common spaces with gardens	Terraces are dynamic and different from each other	A,B,C, D
6	Limited access points	-More access points and entrances	Only one access to the tower	Improve the accessibility to the district	Green areas on the first floor has to be open	Open and large square to gather crowds	BA
7	There is not visual connection between buildings and roads	Open up views to buildings	Terraces keep the connection between ground and terraces	Human scale buildings	Using greenery on the terraces reduce the disconnection with greenery	Trees and shrubs on terraces	A,B,C D
8	Lightning is not enough	Lighting in roads	Lighting from pubic areas and apartments.	A safe place	Social networks through gardening	Community gardens	A,B,
10	No enough services and shops	Commercial base	Included library, culture, student housing, restaurant, and other services	Create a 24 hours area	Private gardens are available 24 hrs	Community garden C	C
12	Housing buildings are too high and is hard to navigate	Change scale	25 storey with a dynamic structure and divers public areas	Better Architectural aesthetic	Public areas enrich the social interactions in the building	Community gardens	A,B,C D
13	Need of housing	Densify the area Define zones in between and create readable outdoor spaces	Provides short amount of apartments	Increase number of houses	Having more apartments requires more green areas on higher floors	Community graden A	A
14	Mono functional	Diversification or multi-functionality	Break the mono function	Dynamic architecture	Different terraces allows interaction between them	Community graden C	A,B,C D
15	Lack of jobs	Multifunctional to provide services	Creates job opportunities in different rectors	Economic centre of the district	Gardens create job opportunities	Technician in Community graden C	C
16	Bad image on media	Strong identity	Could enhance the image of the district	Use NGO for the identity, Yallatrappa, Zlatan football court, multicultural approach	Community gardens are part of the identity of the district	Gardens promoted culture exchange with food	A,B,

Figure (4.18) Table with problems recommendations for the urban planning in Rosengård district. Includes the interpretation of the problems in the urban agriculture context. See appendix for bigger size.

lowest. Each of these categories was taken from the benefits analysed on the literature review in the Section II, for example, climate change mitigation, wellbeing, social interactions, biodiversity, vegetation diversity, job opportunitinies, energy efficiency and management of the areas, represent a value which in this case is between one and three.

According to each of the proposal from the danish company were named on this document A, B, C and D and the improved solution with urban agriculture features called A+, B+, C+ and D+ contribute to the project with different. These values are interpretations counted; activities taking place in the area, vegetation, access to areas, peoples interaction ,furniture, biodiversity, how much will cost maintain the areas and among others. This would give the impact of each proposal in numbers, yet, the values could change from the perspective of each person.The two proposals were compared to the see the differences on each project in the Törnrosen Tower. See Figure (4.20)

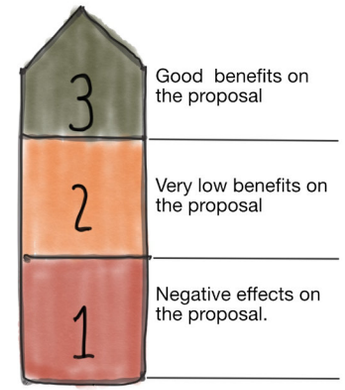


Figure (4.19) Diagram of the grading for the proposal, showing the impact of each value.

		PROJECT	CLIMATE CHANGE MITIGATION	WELLBEING	SOCIAL INTERACTION	BIODIVERSITY SUPPORT	VEGETATION DIVERSITY	JOB OPPORTTUNITIES	ENERGY EFFICIENCY	MANAGEMENT	TOTAL
	Green Roof	A	1	1	2	1	2	1	1	2	**11**
	Green Roof	A +	2	3	3	2	3	3	3	2	**21**
	Terrace	B	2	2	2	1	1	1	1	1	**11**
	Terrace	B+	2	3	3	2	2	1	1	2	**16**
	Wellbeing and Breeding help	C	2	2	1	2	1	1	2	3	**14**
	Wellbeing and Breeding help	C+	2	3	3	3	2	3	2	1	**19**
	Mini Greenhouse	D	1	1	1	1	1	1	3	3	**12**
	Mini Greenhouse	D+	1	2	1	1	1	2	1	1	**10**

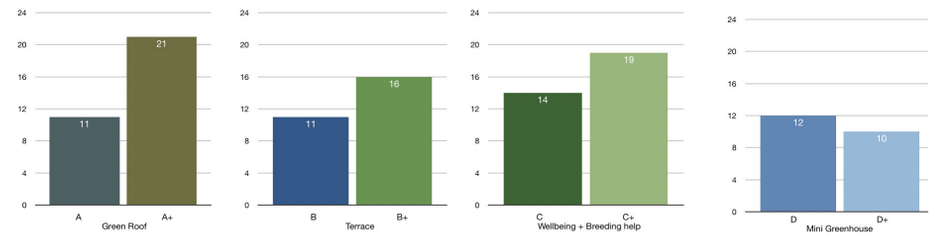


Figure (4.20) Chart with the raking of proposal project in tower, using categories like climate change , wellbeing or social interaction to define the level of improvement with the new urban agriculture infrastructure.

SECTION V

5.0 DISCUSSION

The thesis was divided into two parts, the literature or desk study and the case study, ending in combining the two elements into a design proposal to integrate urban agriculture infrastructure in the urban plan and Törnrosen Tower.

The increasing problems in urban settlements require a larger group of experts from different fields, and in many cases and it is even necessary to collaborate with international groups, NGO's and volunteers. Three problems guided the research in which population growth was the main focus to identify the sources for other issues like climate change and health risk on people. For each of these problems, urban agriculture could be a tool for reducing them by involving urban agriculture in city plans in combination with other solutions. In conclusion, these are the benefits of having food production in cities:

- Reduce food miles, control losses with fewer intermediaries
- Urban agricultural infrastructure helps to regulate the temperature in case of extreme weather conditions
- Better quality of products because of fewer chemicals usually used in the intensive conventional farming
- Reduce runoff, which decrees the risk of urban flooding
- Healthier communities, due to physical activities and connection with nature
- Noise reductions in buildings, reducing pollution new habitats for wildlife and enhance urban biodiversity.

The first aim of this master thesis was explorer and analyse the benefits and challenges of urban agriculture related to new grey infrastructure in Malmö. Using urban agriculture in high structures like the Törnrosen Tower compensates the lack of social interaction between residents in a building by encouraging them to develop sustainable communities in places that lately, due to architectural design, was difficult to imagine. Reconnecting with nature helps to improve wellbeing in the residents that live on the higher floors of the building and finally using the adequate design and tools the gardens could reduce greenhouse gases, flooding and energy waste, among other factors. Urban agriculture increases the positive impact on cities, people and the environment, yet, it is challenging to achieve them and in some cases with the wrong application or use could not make any difference. Many cities were founded on industrial areas, which with the time were transformed into housing developments, parks and offices. Therefore, to be able to grow food in urban settlements, it is required to conduct a soil analysis looking for pollutants that could threaten people's health. In other cases, the used of intensive vertical farming without energy-efficient system systems could require a large amount of energy for keeping greenhouse environments in the optimal conditions for the crops. The growing in cities of all kind of herbs, beans, grains and fruits are limited, by space limitations, weather conditions and other limitations related to policies. In terms of constructions, each of these models requires very specific demands to adapt urban green infrastructure community gardens into grey infrastructure as an example, if the design demands a green roof placed directly on the slab, a few extra layers for construction will be needed; drainage materials, filter preventing the loss of soil particles, soil subtract and vegetation apart from the soil for the vegetation and finally the roof slab needs a layer for waterproofing to protect against roots and water filtration. Finally, community gardens require public participation to keep the gardens active in all seasons. The work depends on plenty on the community, and only a small part of the responsibility lays with stakeholders and municipalities.

Urban agriculture can take place in most of the gaps in the cities that are not used or occupied by grey infrastructure, from the vacant land on the streets too, roof gardens in public offices and houses, it can be either an illegal activity with guerrilla gardening or part of municipal agendas. The community gardens have a more significant challenge in comparison with other urban agriculture infrastructure because it depends on public participation and some other actors involved in the gardens. The main actors for having an ideal community garden are the landowners (private or public) which provide the space, volunteers and public in general are the working force of the gardens, stakeholders or NGO's involved in the process of growing in towns, an employed manager that keep the garden running and is also the mediator between all the actors involved and finally the local authorities like municipalities which provide raw materials, tools and services necessary for the agriculture activities provided to encourage the public participation. Each of these actors with a specific function in the community garden has the mission to be integrated collective actions to get compensation in different ways; people get social benefits; municipalities have less population with health problems or related to the food industry like growing organic products and ecological benefits. An example of environmental benefits of urban ecology infrastructure is the Vertical Forest which provides shelter and food sources to local and foreign bird species in the city of Milan, Italy. Increasing biodiversity in areas that were not popularly visited by different species. It is a good reason for increasing the number of green infrastructures.

The second aim of the master thesis related to the case study guided by the Gehl strategic plan for Rosengård set the basis for designing the Culture Casbah proposal. The project summarised the problems affecting the two neighbourhoods, Törnrosen and Örtagården, which was the location densification program. The urban and tower proposal made an integrated urban strategy to reconnect the district with the rest of the city by creating a landmark with a new dynamic mixed-use development with housing, offices, services and commerce to attract people from other neighbourhoods. A series of visits were made to the site to corroborate the problems presented in the strategic plan for Rosengård by Gehl, the first area to study was set on the Benne's Bazaar and surrounding areas. The district in general terms feels isolated from the rest of the city, the lack of stores, shops and services, making it unattractive for visitors from other areas, in summary, it was a study of users, vegetations, housing, movement and community gardens:

- User: Came by foot and few people using bikes. Residents
- Vegetation, large lawn areas in the courtyard buildings with lack of recreational activities.
- Housing prevails over other uses and architecture is clustered but semi-public.
- Movement: difficult navigation in the neighbourhoods and disconnected to other districts.
- Community Gardens: 12 urban agriculture gardens in both neighbourhoods were inactive during the visit, except the allotment garden.

Finally the last aim of the master thesis which came after, understanding the needs of the neighbourhood and guidelines from municipality plan strategies and literature, the design principals were used as a toolbox to integrate urban agriculture infrastructure into the Culture Casbah proposal, in which were used four standard solutions commonly used around the world; greenhouses, green wall, indoor gardens and raised beds, taking into account growing food as a community. The design solutions were applied in eight projects for the urban plan and four projects for the tower. The last four were analysed in detailed. The proposals A+ and B+ community gardens had social interaction benefits, proposal C+ biodiversity support and wellbeing themes. Finally, proposal D+ encouraged local producers to sell products — each of the proposals as part of the integrated and interconnected urban agriculture infrastructure.

To conclude the qualitative research and case study, the four projects were compared with the proposed green areas from Lundgaard and Tranberg design to identify the benefits and challenges of transforming the areas for urban agriculture purposes. Each of the urban agriculture proposals except the mini greenhouse D+ increased the categories on the comparison and in terms of designing the areas proposed by Lundgaard and Tranberg, some critical feature is missing, for example, the structured flower beds for water filtration into the structure or where the water collected on from rain will be used.

For future studies, the grading system utilised to compared the benefits of the new proposal and the ones made by the Danish company requires another grading system to improve the result of the proposal. Using a survey method to enhance the results would make a significant different in the approach.

Population growth in cities has trigger social, environmental and other urban problems that can be reduced by using urban agriculture in combination with other tools. Cities have a strong influence in the daily life of millions in the whole world, and by 2030 the population in the cities is expected to double (UN-HABITAT, 2016) and it is necessary to include global institutions, NGO's and other institutions with the experience of urban agriculture infrastructure. Recently urban agriculture has been growing in cities for several benefits and even after the harvesting benefit could improve how the cities function.

Rosengård is a multi-cultural district with many virtues and also many disadvantages, which more than any other district requires a better interpretation of the landscape and cultural values. Most of the documents related to the competition of Culture Casbah proposal mention the lack of green areas in the neighbourhoods, however in the site analysis and mapping study it is evident the vast areas of green infrastructure, having high buildings allows reducing the square meter used for housing on the ground. The problem of the green areas in Rosengård is more related to the function of each of them. Most of the areas are large lawns lacking other functions; it is essential to increase the biodiversity and improve the urban ecology. There is no presence of water bodies on the site, which is fundamental to close the chain of infrastructure. The number of urban agriculture infrastructure in the two-neighbourhoods showed Örtagården neighbourhood as the most active on urban agriculture activities in contrast to Törnrosen. One reason could be based on the of a high building, making it more complex to get sunlight on the crops. The public areas, pedestrian paths are hard to follow, and the presence of greenery is less in comparison with Örtagården another reason is the lack participation, due to location and green areas could gather many more gardens. However volunteers and people involved in the gardens require orientation about what to do next with the products, in the community gardens people will need support to place their products in local markets or for trading with other communities, yet there is a lot to do in terms of shared responsibilities from the main actors; public participation, NGO's, local authorities and landowners. Future intervention in urban developments has to consider using urban agriculture not just to target food security issues in cities, but for all other alternative benefits that could contribute to societies, environment and wellbeing.

The benefits of urban food production are incredibly dynamic, and it is a chain of positive features with more positive than adverse effects. We are currently seeing urban agriculture as a source of food, but the benefits do not stop when the harvest is collected that is when urban agriculture starts to be proactive, and all the subsequent benefits take place in our societies.

The informative competition document has a significant impact on how we shape our cities, and it has a significant influence on the Culture Casbah design proposal. It is also important to mention that the interpretation of this document is open to debate, and at the end of the project, the one which fulfils most of the prerequisites of the competition is the winner. Still, companies have the responsibility to go against what was imposed by the competition if something might not fulfil the needs of a place or people.

The informative document for the competition by (MKB Fastighets AB., 2011) is in some cases, contradictory to what was found on the study visit. One example is in the description paragraph mentioning "a feeling of insecurity began to emerge in Rosengård. The area was brought into question, particularly because of the cold external environment where there was lack of vegetation" (reference) which contradicts the research and site analysis, where it is visible to see another result, showing a conflict with the information, as green areas in Rosengård represent a large percentage of the surface. From all of the design solutions proposed, the mini greenhouse project was the only one that did not fulfil the requirements to satisfy sustainable approaches or social benefits. The location on the north façade limited the possibilities of having productive crops due to the lack of sunlight, leading the design to have a source of light that could compensate it, yet, the infrastructure required and prices to build the systems would have made it complicated to make efficient, and management could be complicated to achieve. However, this project could be suitable for other users and purposes, e.g. for intensive food production.

Our society is at the point of taking aggressive actions to compensate the crisis many countries are facing. Future intervention on urban developments have reconsidered including urban agriculture as a planning tool, not just to target food security issues but for all other subsequent benefits from growing food in town, like the energy efficiently, building sustainable communities, less GHG emissions, food culture and learning a new language. The benefits of urban food production are incredibly dynamic, and it is a chain of benefits, that if we reproduce those successful models, it could make a difference in solving some of the most complex issues. Cities around the globe have been transformed, and in some cases the actions must be radical to improve the conditions, yet, we need to be critical and contribute in what ways we can to make things better, that is one of the important features about urban agriculture, people have the control of making changes, and even when it is not allowed, guerrilla gardeners can raise the voice for the most vulnerable groups.

On the background it was studied how the global institutions and governments have been facing a changing urban population, and with it, the grey infrastructure is increasing by providing services and housing to fulfil the demands for living in urban areas. Cities are the centre of economy and are well known for having the most job opportunities in comparison to the countryside areas. Immigration is just a small percentage of the population affecting the urban transformation into a more vertical solution with high buildings (Malmö Stad, 2019b) in Malmö only 43 refugees were offerced asylum, still is the largest in comparasion to Stockholm and Gothenburg The study was based on urban agriculture gardens that have been improving the quality of life for residents of urban settlements and how this conventional farming technics that have prevailed thought history are becoming popular again to reduce some of the most complex issues by public participation. However, with the increasing infrastructure, it is necessary to study the benefits that could be made by having urban agriculture communities in multi-storey buildings, to adapt to climate change events, increase sustainable communities and design better areas that are required nowadays.

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APPENDIX

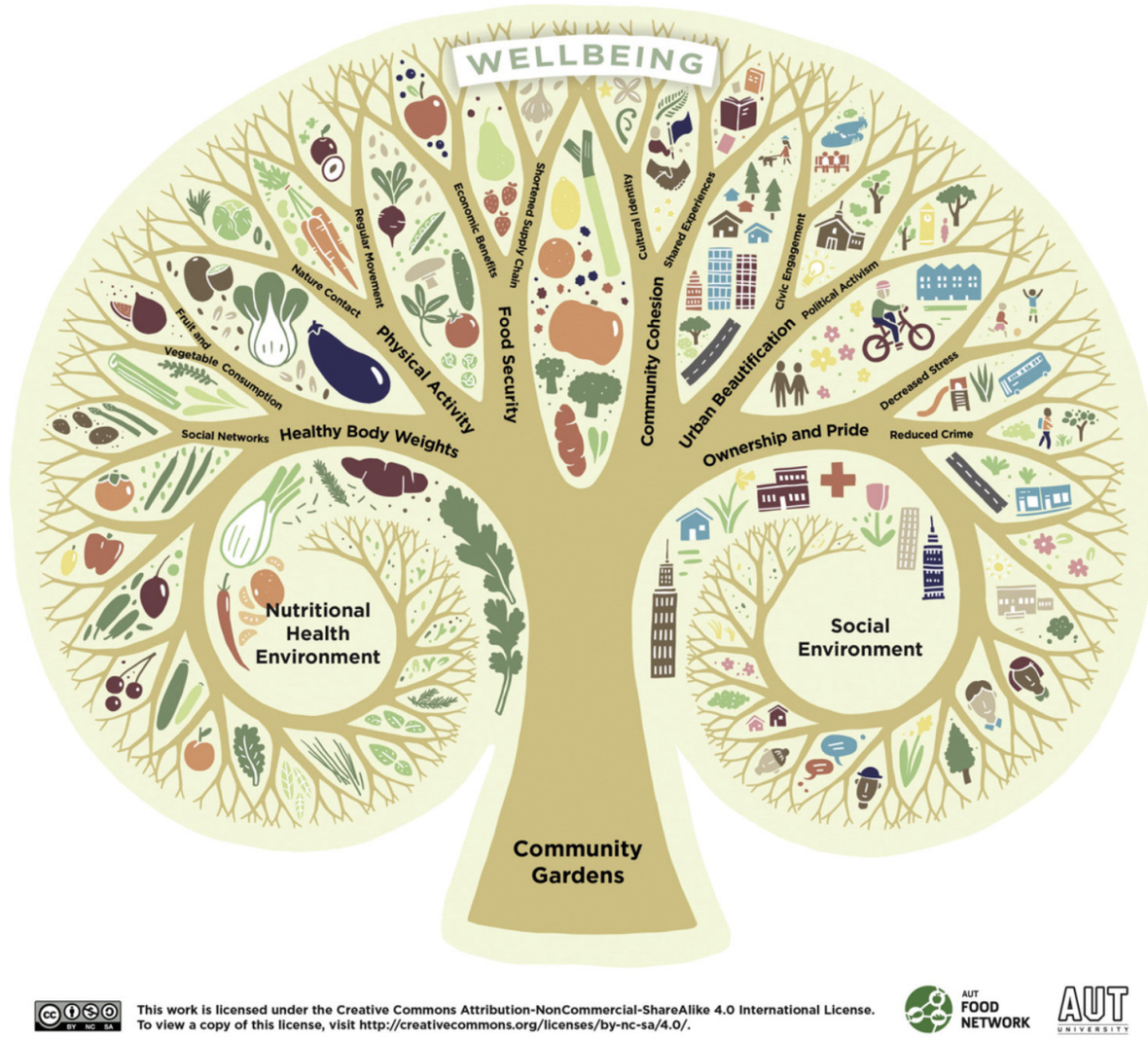

Figure (5.0) Diagram of community gardens and their benefits .

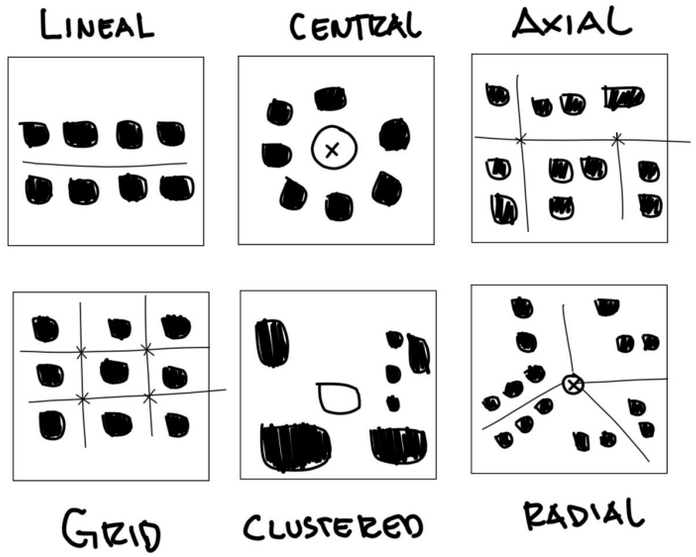

Figure (5.1) Type of urban structures (Ching, 2015)

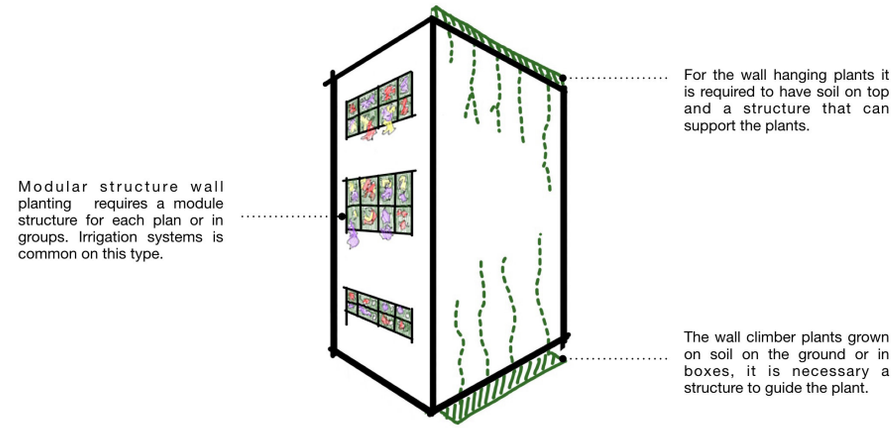

Figure (5.2) Types of Green walls .

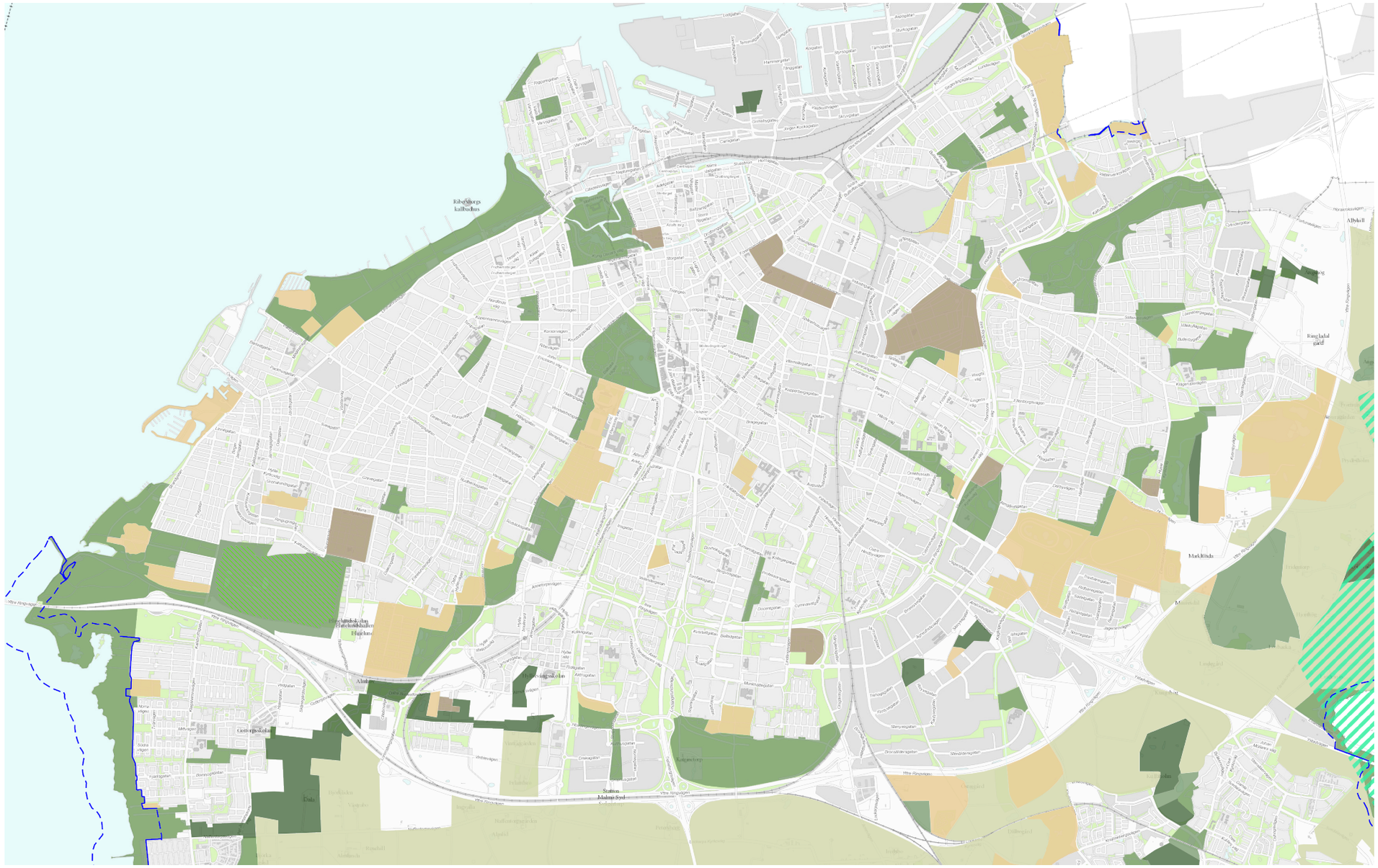

Figure (5.3) Map of Malmö showing the green vs grey infrastructure .

	ORIGIN OF THE PROBLEM	RECOMMENDATION	URBAN PLAN	GOALS	URBAN AGRICULTURE INTERPRETATION	URBAN GARDEN	
Source	Competition	Gehl Strategic plan for Malmö	Lundgaard and Tranberg desing	Gehl Strategic plan for Malmö	Design	Design Solution	
1	The existing psychical barriers, segregate the district	Break down Psychical barriers: Industry, railway, big traffic roads, cars have hierarchy over pedestrians.	The pedestrian and bike road under passage to ground leve	Landmark to attract all kind of people from different parts of Malmö.	Transform barriers into crops (industrial areas into gardens)	Change industrial sites into garden and public places	S
2	Nodes between transportation systems are not clear	Create links between transportations	The only modification the crossing in the street Västra kattarspvägen and Örtagårdstorget	Easier connection between bus and train stations	Green corridors	Allotment garden E is a rehabilitation of lawn into a series of crops	E
3	The existing centre lacks services and functions	Create a Centre	The proposal have many options for restaurants, culture, shopping, etc.	Square for everyone, including kids	Include fruit trees	The markets proposal enhances the actives in the centre of each neighbourhood	M
4	Lack of attractions	Landmark to attract people	Cultural tower, commerce and hostels coffee shops	Attract people to the district	Local food production to attract people	Corridors, Markets and community social centre	M
5	No transition between private and public	Create a clear boundary between public and private	Yards on existing buildings	Create a variety housing building typographic	Green, roofs and terraces	-	
6	Limited access points	-More access points and entrances	It is expected o enclose access where there are entrances at this point	Improve the accessibility to the district	-	Clustered urban type	Bu
7	There is not visual connection between buildings and roads	Open up views to buildings	The housing buildings have more connection due to the high of the buildings and open balconies	Human scale buildings	Incorporate grading on buildings to connect with nature	All the green terraces reduce the scale into a more human one.	Bu
8	Lightning is not enough	Lighting in roads	The proposal has some lighting proposals	A safe Place	Community gardens help to create community for safety	-	-
9	Traffic s limited to some areas	-Connect existing roads with new one's -Link important sites and destinations	New roads	Have a mix used of streets where cars, people and bicycles are together	-	Two new streets connect the main promenade with vegetation on the sides	S
10	No enough services and shops	Commercial base	Enough services on first floor in buildings	Create a 24 hours area	Active centre during the afterwork hours and weekends	Community centre	Co
11	The roads and areas need a better signs	Increase knowledge about the area	Information not found	Improve navigation in the district	Include signs to locate growing communities City tour of growing gardens	Community centre	Co
12	Housing buildings are too high and is hard to navigate	Change scale	Human scale apart from the tower	Better Architectural aesthetic	Green buildings are dynamic and seasonal	Terraces on buildings along the promenade	Bu
13	Need of housing	Densify the area Define zones in between and create readable outdoor spaces	Housing is provided Fulfilled gaps with housing buildings	Increase the number of houses	Include gardens for social interactions and wellbeing	Front gardens in the courtyards are left to the residents to use them for gardening	Bu
14	Mono functional	Diversification or multi-functionality	More dynamic design	Dynamic architectural design	Green terraces and improved courtyards	Community garden B	B
15	Lack of jobs	Multifunctional to provide services	Commerce in the new buildings	More jobs in the areas due to the shops, services and more attractions.	Working places = more jobs	Selling food on markets could improve the economy and makes more jobs	M
16	Bad image on media	Strong identity	New buildings	Use NGO for the identity. Yallatrappa, Zlatan football court, multicultural approach	Gardening in Yallatrappa	Product exchange with other communities in the district. Allotment garden E	E

Appendix (5.4) Table with problems recommendations for the urban planning in Rosengård district. Includes the interpretation of the problems in the urban agriculture context.

	ORIGIN OF THE PROBLEM	RECOMMENDATION	TÖRNROSEN TOWER	GOALS	URBAN AGRICULTURE INTERPRETATION	URBAN GARDEN	
Source	Gehl Strategic plan for Malmö	Gehl Strategic plan for Malmö	Lundgaard and Tranberg desing	Gehl Strategic plan for Malmö	Interpretation of the previews columns into urban agriculture	Design solution	
1	The existing psychical barriers, segregate the district	Breaking down psychical barriers	Access to the services will be harder compared to a more horizontal solution.	Break down psychical barriers	Transform barriers into food corridors	Vertical circulations with green areas for food or supportive biodiversity	VC
3	The existing centre lacks services and functions	Create a Centre	The tower gathers services and functions	Square for everyone, including kids	Public community gardens accessible	Community garden A and C are open	A,C
4	Lack of attractions	Landmark to attract people	Tower with multiple services	The tower will be a landmark	Public areas could include urban agriculture	Community garden A	A
5	No transition between private and public	Create a clear boundary between public and private	Public and private accessibility	Create a variety housing building typographic	Common spaces with gardens	Terraces are dynamic and different from each other	A,B,C, D
6	Limited access points	-More access points and entrances	Only one access to the tower	Improve the accessibility to the district	Green areas on the first floor has to be open	Open and large square to gather crowds	BA
7	There is not visual connection between buildings and roads	Open up views to buildings	Terraces keep the connection between ground and terraces	Human scale buildings	Using greenery on the terraces reduce the disconnection with greenery	Trees and shrubs on terraces	A,B,C D
8	Lightning is not enough	Lighting in roads	Lighting from pubic areas and apartments.	A safe place	Social networks through gardening	Community gardens	A,B,
10	No enough services and shops	Commercial base	Included library, culture, student housing, restaurant, and other services	Create a 24 hours area	Private gardens are available 24 hrs	Community garden C	C
12	Housing buildings are too high and is hard to navigate	Change scale	25 storey with a dynamic structure and divers public areas	Better Architectural aesthetic	Public areas enrich the social interactions in the building	Community gardens	A,B,C D
13	Need of housing	Densify the area Define zones in between and create readable outdoor spaces	Provides short amount of apartments	Increase number of houses	Having more apartments requires more green areas on higher floors	Community graden A	A
14	Mono functional	Diversification or multi-functionality	Break the mono function	Dynamic architecture	Different terraces allows interaction between them	Community graden C	A,B,C D
15	Lack of jobs	Multifunctional to provide services	Creates job opportunities in different rectors	Economic centre of the district	Gardens create job opportunities	Technician in Community graden C	C
16	Bad image on media	Strong identity	Could enhance the image of the district	Use NGO for the identity. Yallatrappa, Zlatan football court, multicultural approach	Community gardens are part of the identity of the district	Gardens promoted culture exchange with food	A,B,

Appendix (5.5) Table with problems recommendations for the urban planning in Rosengård district. Includes the interpretation of the problems in the urban agriculture context.