Nowadays more than half of the world’s population lives in cities. Urbanization is viewed as the primary cause of many problems, but also as the primary stage for more sustainable development in the 21st century. But the increasing and ongoing urbanization changes the economic, social, environmental and political setup of cities and can have several negative impacts related to economic and social inequities and environmental damage. At the same time the global sustainability challenges intensifies. Especially cities need to become more sustainable; they need to abolish their dependence on the unsustainable management of resources like water, energy and food.
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I. Introduction

1. Background

For the first time in history, more than 50% of the world’s population lives in urban areas. It is calculated that the number will rise up to 70% in the year 2050. (World Health Organization, 2010) The Earth’s capacity to provide life-supporting resources, such as clean air and water, is systematically decreasing. Resources are consumed at a faster rate than nature can replace and the demand on resources continues to increase as the world’s population and consumption increases. This causes massive environmental, economic and social problems such as pollution, climate change, ecological degradation, unemployment, health issues and food insecurity. (Worldwatch Institute 2007) One concept which is often talked about to “solve” those problems is “Urban Sustainable Development”.

The ongoing urbanization and the increasing global challenges ask for new opportunities to meet the demands of more Urban Sustainable Development. Urban Agriculture is a phenomenon which is by definition “an occurrence or circumstance that is perceptible by the senses.” (Farlex, 2013) It provides a complementary strategy to reduce urban poverty and food insecurity and enhance urban environmental management. Urban Agriculture has an important role in enhancing urban food security because the costs of supplying and distributing food to urban areas based on rural production and imports continue to increase. Besides food security, Urban Agriculture influences local economic development, poverty alleviation and social inclusion of the urban poor as well beautifies the city and the productively reuse of urban waste. (RUAF Foundation, Resource Centres on Urban Agriculture and Food Security)

Urban Agriculture has been part of cities since the first settlements. Recently the interest in Urban Agriculture increase in prosperity among the society, policy makers and environmentalists. Back in history Urban Agriculture has been a solution to overcome food shortage during, for example, the Great Depression or the 1st and 2nd World War. But with the boom of global challenges and the demand on Urban Sustainable Development, Urban Agriculture experiences a paradigm shift, where food production becomes a minor matter. Many citizens have experienced the various social and economical aspects such as community building or neighborhood revitalization. New forms such as rooftop farming or guerilla gardening develop throughout cities.

As Urban Agriculture has been part of cities for decades and as it contributes to many social, economical and environmental aspects, the aim of this paper is to do a comprehensive analysis on Urban Agriculture and how it appears within cities. The research question will be
supported by secondary questions such as: How did the form and purpose of Urban Agriculture change? What are the main driving forces for the development of Urban Agriculture? What elements influence the Urban Agriculture System?

2 Structure

The paper is constructed in two main parts, which are the theoretical perspective on Urban Agriculture and Sustainable Cities, and the empirical study where a case study on the city of London will be conducted.

The theoretical perspective is divided in three sections. The first will analyze the concepts of “Sustainable City” and provide a short digression through the concept of Urban Sustainable Development and Sustainability. The reason for presenting the theories on Sustainable Cities is that many cities, especially in Europe and North America, which this study will be based on, are seeking to an improved Urban Sustainable Development.

The second section will be a theoretical perspective on the evolution of Urban Agriculture and its economical, social and environmental aspects.

Based on the concepts of Sustainable Cities and the conceptual ideas of Urban Agriculture it will be discussed how the various aspects of Urban Agriculture can relate to the different concepts of Sustainable Cities. Moreover it will be argued why Urban Agriculture therefore can be seen as a tool to support Urban Sustainable Development.

The second part of the paper is built on the empirical study, for which a Case Study on the City of London is conducted. Due the Case Study the role of Urban Agriculture within the specific framework will be analyzed, presented and discussed.

To summarize the results of the theoretical perspective and the empirical study the paper ends with a comprehensive discussion on the research question and the development perspective of Urban Agriculture.

3 Research and Limitation

The aim of the research is to give a comprehensive analysis on Urban Agriculture. There has been a lot of research done on the concept of Urban Sustainable Development and Sustainable Cities but the relation between those concepts and Urban Agriculture has rarely been studied.

The interest in Urban Agriculture has grown the last years and at the same time different research groups have started to analyze Urban Agriculture within different contexts. For example, does the research group COST analyze the role of Urban Agriculture within EU
policies and if it would be important to establish Urban Agriculture in some EU directives or policies, such as the Common Agriculture Policy. Another important research topic is the effect of Urban Agriculture on shrinking cities and how it can contribute to the needs and the shrinking infrastructure in those.

The purpose of this research is to study Urban Agriculture and to present its potential and development to set a milestone among the ongoing research. With a given set of topographical features, climate and traditions, Urban Agriculture changes in response to income growth and urban development, and can take various forms of different levels of development. This paper focuses on the typology of Urban Agriculture as it predominates in North America and European Cities, though scattered examples can be found in cities around the world. Therefore the historical development of Urban Agriculture focuses mainly on the American history.

During the research it became clear that there is no common definition of Sustainable Cities and that there is no common basis or a main concept on Sustainable Cities. Researchers, European Commission as well as Environmentalists have different understandings of what needs to be included in such a concept. Therefore the presented concepts are based on a personal selection.

Because of ongoing research of the topic, there are limited sources and the ongoing disagreements on what a Sustainable City is and what it needs to fulfill is not clear. This paper should pay attention to the phenomenon of Urban Agriculture and how it appears in the present situation of the cities and the global challenges they face.
II. Theoretical perspectives on Sustainable Cities and Urban Agriculture

Anticipatory to the empirical study and how Urban Agriculture appears in the city of London, the perceived role of Urban Agriculture within Sustainable Cities will be used as theoretical framework. Therefore the literature review presents some main ideas of the concept of Sustainable Cities and of Urban Agriculture and ends with a discussion on the role of Urban Agriculture within Sustainable Cities.

The literature review will be guided by the question: How can Urban Agriculture be related to the actual concept of Sustainable Cities? Therefore the theoretical framework will be separated in three parts. The first section will give an overview of different concepts of Sustainable Cities, such as the “compact city” model or the theory of the “ecological footprint”. Further a discourse into the concept of Sustainability and Sustainable Development will be given and how the Concept of Sustainable Cities evolved out of these concepts.

The second part will be the theoretical perspective of Urban Agriculture, how to define Urban Agriculture and what types of Urban Agriculture exist. Further the economical, social and environmental aspects which Urban Agriculture relates to will be presented.

In the chapter “The perceived role of Urban Agriculture in Sustainable Cities” the discussion will be based on how Urban Agriculture can relate to the concept of Sustainable Cities and what effects Urban Agriculture can have within a city. Further, I will highlight possible connections between the different concepts of Sustainable Cities and Urban Agriculture.

1. Sustainable Cities

The following part will analyze different concepts and ideas of Sustainable Cities as they appear in literature. Therefore it is important to mention that it is just a selection of ideas, there is neither an agreeable definition nor a broad accepted theory of how Sustainable Cities look like and function. Many interpretations exist of which characteristics a city should present to be considered sustainable. (The role of urban Parks for the sustainable city, Landscape and Urban Planning, 2004) Some experts argue that, by definition and common sense, cities cannot be sustainable. (Wackernagel & Rees, 1996) Others defend the idea that the concept is utopian, but that we can learn from literary examples. (Blassingame, 1998) Deelstra and Girardet debate that there can be no sustainable world without Sustainable Cities. (Deelstra and Girardet, 2000) Different authors assert that cities will, must, and are becoming sustainable. (Blassingame, 1998)
As Deelstra and Girardet mention, “It is unlikely that the planet will be able to accommodate an urbanized humanity that continues to draw upon resources from ever more distant hinterlands, or which uses the biosphere, the oceans and the atmosphere as a sink for its wastes at the current accelerating rates.” (Deelstra and Girardet, 2000) Goods are sourced from across the globe and natural resources exploiting in a distorted space-time vacuum. (Hopwood & Mellor, Visioning the Sustainable City, 2007) The massive growth in urbanization and its economic context has raised critical environmental and social questions such as the location of production, the linked change in agriculture productivity or the land ownership and form. (Hopwood & Mellor, Visioning the Sustainable City, 2007) It causes high social and environmental impact which spreads far beyond the geographic areas of cities. (Hopwood, 2007; Wackernagel and Rees, 1996)

In view of the urgency to find solutions to meet the global challenges the concepts and ideas of Sustainability, Sustainable Development and Sustainable Cities becomes newly important and at the same time Urban Agriculture attracts more attention. There exists a strong historical connection between Cities and Urban Agriculture as Jane Jacob mentions in “The Economy of Cities”. She argues that Urban Agriculture began in dense tool making and trading settlements that later evolved into cities. Jacobs shows that in pre-historic Europe and the Near East, pre-agricultural settlements of hunters have been identified with quite dense populations. Eventually, edible wild seeds and animals joined obsidian and tools as tradeable commodities within settlements, and the long process of animal and seed domestication began, right within the boundaries of these proto-cities. And when organized agriculture began to flourish, cities grew dramatically, both in population and complexity. Eventually, some (but not all) agriculture work migrated to land surrounding the emerging cities — and the urban/rural divide was born. (Philpott, 2010) There are controversies whether this thesis is true or not but there is a common agreement on the connection and development of urbanism and agriculture. Therefore Urban Agriculture can relate to the question of the location of food production or contribute to the ecological footprint of a city.

The concept and ideas of a Sustainable City has its genetic roots and its main ideas in the concepts of Sustainability and Sustainable development. While the Concept of Sustainability is described as a fairly abstract and broad concept which is subject to a variety of understandings and meanings, (Portney, 2001) Sustainable Development has its common definition by the World Commission on Environment and Development. Sustainable Development requires that “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (World Commission on Environment and Development (WCED), 1987) This definition contains within two key concepts: “the concept of needs, in particular the essential needs of the world's poor, to
which overriding priority should be given; and the idea of limitations imposed by the state of
technology and social organization on the environment's ability to meet present and future
needs." (World Commission on Environment and Development (WCED), 1987) With the idea
that sustainability cannot be addressed without examination of wider relationships between
urban areas and their hinterlands the concept of Urban Sustainable Development evolved.
Haughton and Hunter argue that Sustainable Urban Development is a process which
is ceaselessly dynamic and responding to changing economic, environmental and social
pressure; it is a process which will necessarily vary between cities and that will evolve in
each city differently. (Graham Haughton, Colin Hunter, 1994) Therefore it is important not
only to look at economic, ecological and social aspects within a city, further it becomes
essential to see the built environment as a "second nature" and as a central component to
the livability of the earth. (ibid.) The concept of Sustainable Cities is a continuation of Urban
Sustainable Development.

The awareness of Sustainable Cities, and that cities were recognized as an important sphere
of application of Sustainable Development ideas, grow after the Rio de Janeiro conference in
1992. Since that several documents and programs, as well as strategic plans by the United
Nations, have set guidelines, principles and goals of sustainable urban development. The
Concept of Sustainable Cities has evolved over time and much of what the term conveys
today is considerably different from what it conveyed a decade ago. However, Haughton and
Hunter argued that the very notion of what constitutes a Sustainable City will inevitably
change over time, as our understanding of global and local environments becomes more
sophisticated and that the sustainable city is not an end point moreover it is a direction,
"something which the notion of organic planning seeks to capture. (Graham Haughton, Colin
Hunter, 1994)

Referring to Portney, advocates of local sustainability have sampled to collect several
analogies that help to visualize elements of Sustainable Cities. (Portney, 2001) Naess points
out five elements that are emphasized to Sustainable Urban Development:

- "Reduction of the energy use and emissions per capita in the area (city, municipality,
or region) down to a level compatible with the ecological and distributional criteria for
sustainable development at a global level.
- A minimizing of the conversion of and encroachments on natural areas, ecosystems
and soil resources for food production.
- A minimizing of the consumption of environmentally harmful construction materials.
- A replacement of open-ended flows, where natural resources are transformed into
waste, with closed loops relying to a higher extent on local resources.
A sound environment for the city’s inhabitants, without pollution and noise damaging to the inhabitants’ health, and with sufficient green areas to give opportunities for the population to experience and become emotionally related to nature.”

He argues that there are contradiction within these five elements and especially how cities try to meet those goals. (Naess, 2009)

One of the most important analogies to suggest that Sustainability at local level is relevant is presented by Rees and Wackernagel, who developed and applied the idea of the “ecological footprint” to urban areas. The concept refers to the size of the environmental impact that is imposed on the earth and its resources. Rees and Wackernagel suggest that the demands that humans place on the earth can be translated into an amount of land necessary to meet those demands. In addition sustainable places should seek to reduce and minimize their ecological footprint by, i.e. reducing their impact on the environment. Presumably, a city´s ecological footprint can only be reduced by reducing the amount of land necessary to support that city’s consumption and production. But at the same time it is not reasonable to think a city can be completely self-sufficient, however making efforts to do so and to minimize the ecological footprint is a step in the right direction. It is not possible to see the city as a separate system in relationship with its nearest hinterland. Moreover it is important to see its ecological footprint in an international and global context. This raises Portney’s question, about the central element of sustainable cities and how self-sufficient cities can be.

A different perspective is presented by Naess who points out that there are two main concepts of Sustainable Cities. The concept of the “compact city” which mainly focuses on the negative environmental consequences of a land-consuming and sprawling urban development in terms of loss of natural and agricultural areas and a high energy use for transport and in buildings. This concept is part of discussion in countries such as Norway, Great Britain and Germany. (Naess, 2009) The “green city” model represents the possibility of establishing ecological cycles of water and sewage within separate neighborhoods or even at the individual site and how land use could contribute to a higher local self-support of, for example, agricultural products. (ibid.)

The two models present very different guidelines for action concerning the desirable location and structuring of new built up areas. While the “green-city” model requires that new development should take place as a spatial extension of the city, the model of the “compact-city” refers to a development that should be met through densification within urban areas. (ibid.)

Professionals, who have advocated the “green-city” as the most sustainable model, argue that some sustainability and environmental concerns speak against too dense urban
structures. On the other hand, the model of the “compact-city” mainly argues that a dense city would reduce traffic and therefore emission. The model of the “green city” mainly focuses on recycling and local self-support and to raise the concern about environmental issues beyond the immediate well being of local inhabitants. This idea refers in some parts to the reduction of the ecological footprint. But at the same time Naess brings forward the question if the green model presents more or less landscape esthetical and architectural ideals, coupled with ideology of decentralization. (Naess, 2009)

Next to many environmental considerations, the concept of quality of life is central to all the various concepts of a Sustainable City. But many attributes that are referring to the concept must be better defined. (Rogers, 1998) Quality of life is largely based on cultural values and hence what may be considered a good quality of life by some may be considered poor by others. Further the measurement of good quality of life may not necessarily result in personal well being in terms of happiness and satisfaction. But Sustainability of a city needs to go beyond quality of life. (Egger, 2006) Because of the complexity of the quality of life concept and the different parameters to measure it, I will exclude the concept from my further study.

The concept of Sustainable City manifests itself in many different forms depending on cultural, political, economical, historical and geographical factors. According to Rogers the concept of Sustainable Cities must recognize that the city needs to meet social, environmental, political and cultural objectives as well as economic and physical ones. (Rogers, 1998)

As presented above, the concepts of Sustainable Cities raises several discussions among researches and planners. There is, as Shmelev describes “a common agreement that the development of methodology for the study and management of the city as a complex multi-layered holistic system poses certain difficulties.” (Shmelev, 2009) One point is to move away the mono-disciplinary approach, when the system is split into a multitude of separate objectives, each of which requires an individual method of enquiry, analysis and management. (ibid.) What does a Sustainable City look like, and how to plan for it is still uncertain and the question raises if there will be ever a specific answer. The variety of different circumstances each cities presents, demands for individual answers. This means that there is and won’t be only one model which can easily be applied by cities. Beatley and Manning (1997: 3) point out, “there is a general sense that sustainability is a good thing (and that being unsustainable is a bad thing), but will we know it when we see it?” (Portney, 2001)
2. Urban Agriculture

In line with the research question, Urban Agriculture builds a main part of the literature review. Consecutively, the ideas and definition as well as some historical information on Urban Agriculture will be presented. The history of Urban Agriculture should point out the development of Urban Agriculture over the past years and how its purpose transformed. The main focus will be on the economic, social and environmental aspects of Urban Agriculture.

Definition

Nowadays Urban Agriculture as such is a permanent feature of many city developing plans and thus considered an important component for Urban Sustainable Development (de Zeeuw, Guendel, Waibel, 2005) Typical for Urban Agriculture are the intensive production methods that recycle nutrients, improve soil, and foster plant and animal growth without the use of hazardous chemicals. Moreover, Urban Agriculture is seen as a dynamic concept that comprises a variety of farming systems ranging from subsistence production and processing at household level to fully commercialized agriculture. (ibid.)

For this paper the comprehensive definition of Urban Agriculture given by the United Nations Development Program is relevant. “Urban Agriculture is an activity that produces, processes and markets food and other products, largely in response to the daily demand of consumers within a town, city or metropolis, on land and water in urban and peri-urban areas, applying intensive production methods, using and reusing natural resources and urban wastes, to yield a diversity of crops and livestock.” (United Nations Development Program (UNDP), 1996)

The Maryland-National Capital Park and Planning Commission describes Urban Agriculture as strategy to enhance urban food security and health, support community building, contribute to urban environment management, and provide educational and recreational services, further it can improve the quality of life in urban and suburban areas. (Maryland-National Capital Park and Planning Commission, 2012)

History and Typologies of Urban Agriculture

Urban Agriculture is increasing, the Maryland-National Capital Park and Planning Commission see the reason for that in “the slow food movement, sustainability, environmental stewardship, food security, and access to healthy, affordable and culturally appropriate food, along with the increasing significance of community empowerment, cultural diversity and connection to earth as contribute to the rebirth of urban agriculture.” (Maryland-National Capital Park and Planning Commission, 2012)
Throughout the past decades, new forms of Urban Agriculture such as rooftop farming or guerilla gardening evolved and traditional forms such as city farms and community gardens modified in its purpose. The Urban Agriculture movement started in the late 1990s and is the result of a development throughout decades. It is estimated that mid-1990’s over 800 million people were engaged in Urban Agriculture worldwide. (Smit 1996)

As already mentioned above, Jane Jacobs refers to Urban Agriculture as part of cities since the first settlements developed. She argues that settlements could only develop because of the existence of Urban Agriculture. In earlier times, Urban Agriculture was mainly a strategy to overcome food shortage; for example during the economic depression or the 1st and the 2nd World War. The wild seeds and animals were used as trade commodities within settlements as well (Green, 2012)

During World War I, Urban Agriculture appeared in the form of Liberty gardens. These Liberty gardens were the spearheads of a US government campaign to react on the shortages in food production. As a response to the cuts in consumption, community gardens began to develop. After the war in 1919, the gardening effort decreased and the liberty gardens disappeared again but many people kept their gardens. During the Second World War, over 528.5 million pounds of food was harvested in the United States and it was then that for the first time the term "city farmers" was born.

Another important period was the Great Depression between 1920 and 1939, when poverty and high unemployment caused severe problems. Relief and subsistence gardens or welfare garden plots were developed to provide food and boost the population morale. Initially, individual gardens were established by local charities and municipalities. The first programs that were developed provided staff, seeds and guidance in Urban Agriculture. In 1934, over 23 million US households participated in subsistence garden programs. (Lawson, 2005). In addition to these subsistence gardens, the Federal Emergency Relief Administration initiated a work-relief garden program where gardeners received a wage for cultivation and distribution of the products to those in needs. The relief gardens improved the health and spirit of the participants by creating feelings of usefulness, productivity and importance while also providing opportunities for food and work (Tucker, 1993)

During World War II, Gardens once again became part of the urban landscape. New forms of Urban Agriculture developed on vacant lots, back yards and city parks. The War Food Administration, which was responsible for the administration of the allies’ food reserves, created a National Victory Garden Program. This time the gardens were no longer just for the poor or for those who could not feed themselves, but for everyone. Overwhelming
participation in the victory garden campaign not only grew food for personal consumption but also brought mental and physical health benefits to the community. The success of the victory gardens showed that the program made a difference. But as soon as the war ended, the government stopped promoting the gardens. Only a few surviving school and community gardens in urban areas provided the continuity and inspiration that led to renewed interest in gardening in the 1970s. (Lawson, 2005)

At the beginning of the 20th century the population increased fast, cities stretched and problems like urban congestion, immigration, economic stability and environmental degradation increased. (The Maryland-National Capital Park and Planning Commission, 2012) Reformers saw the best way of dealing with these issues through consumption and creation of beauty and gardens. Supported by organizations, underutilized lots in the cities were converted to garden plots.

Throughout history Urban Agriculture had many different forms and appellations. The Maryland-National Capital Park and Planning Commission classifies the variety of Urban Agriculture as follows:

- Home Gardens
- Community Gardens and allotments
- Market gardens/commercial farming
- Guerilla gardens
- Youth, School and Demonstration Gardens
- Institutional Gardens
- Edible landscaping

Historically, Home gardens, Community gardens and Allotments are the oldest forms of Urban Agriculture. Home gardens are situated at private homes and food produced is for personal consumption. This includes front, side or backyard gardens, container gardening on a patio or balcony or even window boxes. Through Home gardens people supported themselves and their family with food. With the Community garden movement in 1970’s, Community Garden Plots and Allotments developed. Community garden plots refer to an individual plot rented from public entity, private entity or community organization to grow food (fruit trees, herbs, tomatoes) or non-food crops (flowers, ornamental plants) for personal consumption. Allotments already developed in the 17th century as compensation for private enclosure by major landowners. With the Industrial Revolution in the 18th and 19th century,
which drew the rural poor to urban areas, allotments became a feature of urban life. (The Maryland-National Capital Park and Planning Commission, 2012)

Also around the 1970’s, city farms came into view. They often keep unusual or non-commercial breeds of poultry, sheep and goats as well as non native animals. Today, the products are usually sold in Farm shops or in the own Farm cafés. Often these types of Urban Agriculture are funded through a mixture of sources including local authorities and charitable trusts while managed by members of the community. Farm shops are comparable with Market Gardens or Commercial Farming. In Farm shops, products grown at homes or in community gardens are sold. (The Maryland-National Capital Park and Planning Commission, 2012)

Some of the unusual forms of Urban Agriculture are Guerilla Gardens, Youth-, School- and Demonstration Gardens, Institutional Gardens or the form of edible landscaping. (The Maryland-National Capital Park and Planning Commission, 2012)

Guerilla Gardens are operated by an individual or community members on public or private land without permission of the landowner. Some are created by enthusiasts simply to grow plants. Others result from activism aimed at making fresh products available to those who otherwise do not have access to healthy food. But the most common motivation is to beautify abandoned or neglected properties perceived to be eyesores and potential sites for crime. (The Maryland-National Capital Park and Planning Commission, 2012)

Youth, School and Demonstration Gardens are primary used for education on food production and consumption of the products. In case of the Demonstration Gardens the purpose is often research and demonstration to the public of how and what to grow. These types of gardens are used to increase the environmental awareness of agricultural impact on the nature and help to understand certain processes. (The Maryland-National Capital Park and Planning Commission, 2012)

Institutional Gardens can be found in many cities but they are often not acknowledged in Urban Agriculture typologies. Institutional gardens are situated on the property of an institution such as a hospital, prison, faith-based organization, college, community center or workplace. The growing of food is primarily for therapeutic or educational purposes. Also part of many cities and but not viewed upon as Urban Agriculture is Edible landscaping. It includes for example orchards and it is characterized by using food producing plants for ornamental purposes on public or private property. In this case the plants are mainly used as landscaping elements. (The Maryland-National Capital Park and Planning Commission, 2012)
Another form of Urban Agriculture is the *Entrepreneurial urban farm* which is described as a profitable or non-profitable operating farm that is a business enterprise where agricultural activity takes place. (The Maryland-National Capital Park and Planning Commission, 2012)

Depending on the local forms, different livelihoods and resource circumstances, Urban Agriculture can have diverse purposes and its occurrence varies accordingly (de Zeeuw, Guendel, Waibel, 2005). This variety is one of the main attributes which contributes to its importance within a wide range of urban situations and for a diverse range of stakeholders (ibid.). In general, Urban Agriculture is performed as a niche function in terms of both time (transitory), and space (interstitial). Most often it is conducted by specific social groups (e.g. women and low income groups) and under specific economic conditions (e.g. financial crisis, food shortage) (ibid.). Mougeot (1999) points out the importance and diversity of Urban Agriculture systems in any given city. Its occurrence is highly dependent on multiple factors at different levels:

- “global (international trade)
- national (level of development, fiscal/ financial structural adjustment, disasters, agricultural policies)
- regional (urban food supply system, prevailing agroclimate, strength of agricultural and food traditions)
- urban (population growth and densities, physical layout, employment levels, consumers’ tastes and market niches, legislation)
- district within the city (urban vs. periurban, low vs. high income, low vs. high densities, residential vs. other uses)
- household (size, dependency ratios, income levels, gendered responsibilities); and to
- individual (education level, particular mix of occupations, farming skills, access to resources, contacts with suppliers/clients).” (Mougeot, 1999)

The urban environment in cities has changed in time, and the challenges cities are facing today are different from the challenges a 100 years ago. This may explain why Urban Agriculture occurs in so many different forms and with different purposes. During the 1st and 2nd World War, community gardens were used to provide food and to overcome food shortage. Nowadays, community gardens are about meeting people, sharing experiences and creating a lively neighborhood.
Economic, Social and Environmental aspects of Urban Agriculture

As Chris Lazarus mentions: “No other economic development activity has as much appeal to those concerned with sustainability as Urban Agriculture: city dwellers connecting with the earth, growing their own healthful food, and often making money doing so; abandoned lots being cleared of debris and transformed into beautiful green public spaces, filled with life, color, and value, in the bleak urban jungle; people of all ages with little or no employment possibilities learning job and life skills working with nature; cities reducing the fuel-burning and air-polluting impact of transporting solid waste and food long distances because organic waste is recycled into compost and food is grown in the neighborhood where it is consumed; and food production moving away from herbicides, pesticides, and other toxins upon which American agricribusiness has become so dependent.” (Lazarus, 2005, p 1)

Urban Agriculture can provide for multiple aspects of city development. As already mentioned, it always depends on the built environment of a city, the cultural consistence and the political strategies whether those aspects will occur within this specific framework. In the following section different economic, social and environmental aspects will be presented.

Economic aspects


Urban Agriculture however is just one source of supply in urban food systems and only one of several food security options for households (Mougeot, 1999). It is a tool to make productive use of urban open space, treating and/or recovering urban solid and liquid wastes, saving or generating income and employment, and managing freshwater resources more effectively (Mougeot, 1999).

“In a depressed economy with high unemployment, urban agriculture can create jobs, generate income, and promote financial stability.” (The Maryland-National Capital Park and Planning Commission, 2012) Ken Dunn, founder of “the Resource Center and City Farm program in Chicago, considered Urban Agriculture to be a significant potential contributor to job creation and economic development as well. Dunn estimated that one acre of urban land used for farming may support seven job opportunities in farm laborers, management, technical services, engineering to operate high tech systems, marketing or accountancy. (The Maryland-National Capital Park and Planning Commission, 2012)
According to the American Planning Association, food-related enterprises are among the most common small businesses and present a way for many households to supplement incomes and achieve economic stability *(American Planning Association, Policy Guide on Community and Regional Food Planning, 2007)*.

In addition, a study by the New York School of Law and NYU’s Furman Center for Real Estate and Urban Policy found out that community gardens have significant positive effects on surrounding property values. *(Voicu & Been, 2008)* The transformation of vacant land and abandoned properties into farms and gardens improves the image and helps to revitalize the neighborhood, which has a positive effect on property values and therefore on the real estate market. *(The Maryland – National Capital Park and Planning Commission, 2012)*

**Social Aspects**

When analyzing Urban Agriculture in terms of social aspects it is often seen as a community building tool, where community members are brought together around common interests thus promoting interaction and creating bridges between cultures *(The Maryland – National Capital Park and Planning Commission, 2012, p.18)*. Depending on the different social groups, Urban Agriculture can have different purposes and effects. Community gardens in particular are a tool for building a sense of community. They attract residents as volunteers and create festive and fun environments strengthening the community and the neighborhood environment *(The Maryland-National Capital Park and Planning Commission, 2012)*.

The Maryland-National Capital Park and Planning Commission identified Urban Agriculture as a tool for development of the youth, where young people can gain knowledge about growing food, job readiness as well as entrepreneurial and life skills *(The Maryland-National Capital Park and Planning Commission, 2012)*. The responsibility and the action young people can take in the activities prevents crime and gives young people as well as the rest of the population a sense of empowerment. Another platform for young people to get integrated into Urban Agriculture is through school gardens and city farms. The educational purpose of city farms and school gardens raise the environmental awareness of chemical intense agriculture.

Moreover the reclamation of degenerated or unused urban areas leads to neighborhood revitalization *(Mougeot, 2006; Kaufman and Bailkey, 2000)* and supports active identity and citizenship *(Garnett, 1996)*. In addition Mougeot analyzed Urban Agriculture to increase food security and improve nutrition as well as physical and mental health of the citizens *(Mougeot, 2006)*.
Urban Agriculture is a tool to achieve social justice and reduce discrimination by providing food security, sovereignty and inclusion of women, ethnic minorities, elderly and other disadvantaged people within the process. The access to healthy and fresh food contributes to proper nutrition among disadvantaged communities and helps to improve their productivity by providing them with opportunities to earn additional income. At the same time it promotes cultural diversity and helps to preserve the cultural background of immigrant populations and to pass their traditions on to new generations.

Environmental aspects

Environmentalists strongly emphasize the several different ways in which Urban Agriculture can positively impact a city's environment.

One environmental aspect of Urban Agriculture is the development of green zones throughout the city. This creates diverse flora and fauna within the sterile urban environment and at the same time support the habitat of other organisms, which increase the biodiversity conservation throughout the built environment (The Maryland – National Capital Park and Planning Commission, 2012; Howe, 2005; Deelstra and Girardet, 2000). Furthermore, the green zones of Urban Agriculture improve the physical climate of the city. They provide for an increase of humidity, they lower the temperatures and introduce more pleasant odors. The plants capture dust and gases from air pollution and improve the microclimate within the city. Moreover, Urban Agriculture contributes significantly to the capturing of air pollution caused by transport emissions. Through locally produced food the transport of products can be reduced which on its turn reduces the emission of CO2 other pollutants. Though maybe a little far-fetched this can have effects on climate change (The Maryland-National Capital Park and Planning Commission, 2012; Mougeot, 2006).

Urban Agriculture provides several opportunities for recycling and reusing organic waste and nutrients. By reusing waste water and solid waste as key inputs to the food production it closes the nutrient loops (Deelstra and Girardet, 2000; The Maryland-National Capital Park and Planning Commission, 2012). Mougeot calls this a “triple win”, which means it cleans up the urban environment, reduces the threat to public health and increases agriculture production by replacing soil nutrients (Mougeot, 2006).

3. The perceived role of Urban Agriculture in Sustainable Cities

The following part of the paper aims to discuss the relationship between the presented concepts of Sustainable Cities and Urban Agriculture. As already mentioned is there no overall model of Sustainable Cities or common accepted parameters which need to be
fulfilled to call a city sustainable. Developed out of the concept of Sustainable Development, the common definition by the World Commission on Environment and Development requires that “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” (World Commission on Environment and Development (WCED), 1987) Both the concept of Sustainable Development and the variety of concepts of Sustainable Cities are very vague and open the opportunity that almost anything can be related to Sustainable Development. It does not provide any further answer of what are the “needs” of the future. Depending on the present global challenges, it is obvious that fossil energy sources and the ongoing climate change will change future conditions. But how does Urban Agriculture can meet the present demands?

The most common models of a Sustainable City are the model of the “ecological footprint”, the “compact” city model and the idea of greening the city. Previously it was mentioned that Portney has sampled and collect several analogies that help to visualize Sustainable Cities and which are emphasized to Sustainable Urban Development. Ongoing these elements will be presented and how Urban Agriculture can relate to those.

1 Reduction of the energy use and emissions per capita in the area (city, municipality, or region) down to a level compatible with the ecological and distributional criteria for sustainable development at a global level

Through local food production, transport emission and costs can be reduced can relate to a global improvement of Urban Sustainable Development.

2 Minimizing of the conversion of and encroachments on natural areas, ecosystems and soil resources for food production

Through the different typologies Urban Agriculture can have, there is the possibility of shared land area or rooftop farming, where there is no further encroachment of natural areas is needed.

3 Minimizing of the consumption of environmentally harmful construction materials

Often Urban Agriculture complies a niche function, it can take place everywhere and more often it takes place on rooftops or throughout vacant plots and therefore does not require any construction materials. The farming on vacant plots can lead to a revitalization of neighborhoods without high effort.

4 Replacement of open-ended flows, where natural resources are transformed into waste, with closed loops relying to a higher extent on local resources
Through Urban Agriculture the open nutrient loops by consumption, production and recycling can be closed. Moreover does the food production moves away from herbicides, pesticides and other toxins upon which agribusiness has become so dependent (The Maryland-National Capital Park and Planning Commission, 2012)

5 Sound environment for the city’s inhabitants, without pollution and noise damaging to the inhabitants’ health, and with sufficient green areas to give opportunities for the population to experience and become emotionally related to nature (Portney, 2001)

Urban Agriculture improves the air quality throughout the city which not only improves physical but rather mental health. Further does Urban Agriculture creates green zones throughout the cities which creates diverse flora and fauna within the sterile urban environment. Plants and trees can function as a natural noise protection also.

In the literature Urban Agriculture often relates to economic development, social equity and environmental preservation. Especially in terms of the environmental aspects, Urban Agriculture can provide many aspects which refer to Urban Sustainable Development. Through Urban Agriculture it is possible to reduce the fuel-burning and air-pollution impact of transporting solid waste and food long distances.

However Urban Agriculture does refer to all of the presented models of Sustainable Cities. By producing food within the city, Urban Agriculture reduces transport costs what directs towards the compact city model. At the same time Urban Agriculture can take place on rooftops and windowsills which allows, as in the compact city model mentioned, a densification of the city.

Another aspect of Urban Agriculture is the waste management. Often it is argued that it closes the nutrition loop which refers to the idea of recycling within the green city model. Further does the aspect of food production relates to the local self support which is part of the green city model as well.

Focusing on the concept of reducing the ecological footprint of cities it should be mentioned that through the variety of Urban Agriculture the amount of land necessary to support cities consumption and production could easily be reduced by rooftop or small scale farming. This refers to Hopwood’s and Mellor’s argument that bringing provisioning as close to use as possible would mean implementing urban agriculture within the city and linking the city with the surrounding countryside. (Hopwood & Mellor, Visioning the Sustainable City, 2007)

Urban Agriculture covers many aspects of the main Sustainable City ideas, such as reusing waste, reducing transport emission and therefore affecting global challenge such climate change and food shortage. At the same time Urban Agriculture refers not only to one specific
model of Sustainable Cities, moreover it covers aspects of all three presented models. Which leads to the conclusion that Urban Agriculture covers some of the main ideas of different concepts and therefore can be seen as a tool to support urban sustainable development. But the different concepts and how Urban Agriculture relates to them and the way they can be achieved are contradictorily.

But at the same time there cannot be concluded how a Sustainable City can be achieved. As Naess and Hopwood & Mellor argue, a Sustainable City is not possible without rethinking of the urban life as it is nowadays. By involving the citizens into the process of Urban Agriculture, Urban Agriculture can raise the awareness of global challenges such as food shortage and environmental concerns. Further is the variety of Urban Agriculture and therefore the high flexibility optimal to react to changes within cities and contribute to a wide range of urban situations.(Naess, 2009)(Hopwood & Mellor, Visioning the Sustainable City, 2007)
Methods

The purpose of the thesis is to give a comprehensive analysis on Urban Agriculture and how it appears in cities. Secondary questions to be answered are how it evolved in its form and purpose. What are the main driving forces for the development of Urban Agriculture and what elements influence the Urban Agriculture System?

In order to answer the basic research question and the secondary question, the research method of a single-case study was used. An antecedent literature review was made to analyze different concepts and ideas of Sustainable Cities and Urban Agriculture. The aim of the literature review was to present the merger between Urban Sustainable Development and Urban Agriculture, and to reflect on the theoretical framework of how Urban Agriculture can be related to cities and urbanization challenges.

The purpose of the empirical study was to analyze within a specific framework how Urban Agriculture appears in the city of London, and how it can relate major problems such as high density or social inequity. The single-case study provides the opportunity to focus on the contemporary phenomenon of Urban Agriculture in a real life context.

The research method of a case study, which is commonly held in the social sciences, has the advantage to use and analyze various sources such as documents, archival records, interviews, direct observation, participant observation and physical artifacts. The use of multiple sources of evidence in case studies helps to address a broader range of historical, attitudinal and behavioral issues. Further does the single-case study help to establish a framework for discussion and debates in the final chapter.

Within a case study it is possible to focus on the participants involved in Urban Agriculture and the full richness and extensiveness of the phenomenon of Urban Agriculture.

"In brief, the case study method allows investigators to retain the holistic and meaningful characteristics of real-life events, such as individual life cycles, small group behavior, organizational and managerial processes, neighborhood change, school performance, international relations, and the maturation of industries" (Yin, 2009 p.3)

London is an appropriate case study because it represents, with an average of 4480 people per km2, one of the most densely populated parts of the European Union. Such a dense city faces many economic, social and environmental problems which can be connected to many other megacities which help to draw some main conclusions on the topic. Moreover is London known as a “green city” which offers with its built environment and its Green Belt many opportunities for Urban Agriculture.
To make an appropriate single case study the research question needs to be in focus. Therefore a comprehensive analysis on Urban Agriculture and how it evolved in its form and purpose throughout London will be given. The disposition of the empirical study is based on Mougeots multiple factors, which he points out are mainly important and influence the diversity of Urban Agriculture Systems. Those multiple factors range from global, national, regional, urban, district within the city, household and individual levels.

The results of the empirical study will concentrate on the global, urban and individual level of London. The global level mainly focuses on the international trade. In terms of Urban Agriculture the import and export of fruit and vegetables becomes important. The Ministry of Agriculture and the Report “Cultivating the Capital” by the Planning and Housing Committee provide an overview on the present situation of the international trade situation concerning agriculture products.

The Urban Level includes an analysis of London’s population growth, density and of the physical layout of the city. Therefore different documents, such as “Capital Growth”, “The Bigger Picture” and “The Green Grid” were studied. One main element of London’s built environment is its Green Belt. To give a comprehensive overview on the Green Belt and how it developed and what role it has within the city environment, the National Planning Policy Guidance and a report “Planning on the Urban Fringe” were studied. Further a discourse on Ebenezer Howards “The Garden City of Tomorrow” was given.

Referring to Mougeots idea, the individual factors which the Urban Agriculture system depends on are based on the education level, particular mix of occupations, farming skills, access to resources and contacts with suppliers/clients. Therefore, the chapter on individual factors focuses on individual occurrences of Urban Agriculture in London. Those are specific initiatives, typologies and actors of Urban Agriculture. Therefore newspaper articles and webpages were analyzed.

During my analysis I focused on how Urban Agriculture takes place in the city of London, and how local initiatives and citizens are supported in their Urban Agriculture business.

Important for the empirical study was to give an overview how present Urban Agriculture is in London and how it appears throughout the city. Further I analyzed the visions of political set up initiatives such as “Capital Growth” and focused on how those meet the needs of the Urban Agriculture activists. Therefore data from the corresponding webpages were collected and analyzed.
IV. Urban Agriculture: the case of the city of London

The awareness of Urban Agriculture in London has grown in the last decades; it is not only a bottom up process anymore. More often policy makers set up new initiatives to support the different way of food production. “Capital Growth” is London’s first large scale coordinated and dominant initiative in supporting Urban Agriculture. The initiative supported by the Mayor of London, the London Food Link and the Big Lottery’s Local Food Program helps to encourage food growing by communities and provides projects to grow food as sustainable as possible.

The target of Capital Growth was to create 2012 new community food growing spaces across London by the end of 2012. Now they have reached to manage 2024 spaces and the number is still growing. The total area covered by Capital Growth is close to 500,000 square meters or 124 acres. Capital Growth encourages organizations to make land and gardening materials available for people. Further they support networks for growers and influence public policies that land for food growing is provided for the long-term.

About 22 of London’s 33 boroughs have signed up to support “Capital Growth” and to gain and share expertise on how to deal with Urban Agriculture. Many groups which are involved in Urban Agriculture have adopted practices that are good for London’s environment, such as waste management through compost, using recycled materials or trying to attract wildlife and bee hives. Therefore Capital Growth is not just an initiative to support Urban Agriculture, it becomes part of London’s Sustainable Development Strategy as well.

The Commission for Sustainable Development in London has set out a sustainable development framework to promote an integrated approach. The framework should provide a context for policy development and decision-making; to undertake sustainability appraisals of projects, plans and strategies, and to monitor progress towards a more sustainable “city way of thinking”. This approach attends policy makers and Londoners alike taking Responsibility for how their actions impact other people, and the environment. Further they should adopt an attitude which Respects London’s diverse populations and environment everyone should consider ways in which to manage the earth’s Resources more prudently and thereby achieve positive Results. It makes sense if opportunities and impacts, across these four “Rs”, are considered together and the benefits become mutually self-reinforcing. If this is taken to the example of Urban Agriculture then being involved in Urban Agriculture will not only increase the Responsibility of Londoners for their action in the Food Growing Process and the taken responsibility for the environment. Moreover it leads to increased Respect referring to the environmental aspects of Urban Agriculture and the consumption of the earth’s Resources would be reduced and thereby it would deliver broader positive Results. These
results would include reducing transport emission and package congestion as well as improving health through the increase in daily physical exercise.” (Sustainable Development Commission, 2009) The Capital Growth campaign demonstrates how sustainable initiatives such as Urban Agriculture can have significant benefits for modern cities – encouraging practices that promote ecological sustainability as well as individual and community health.

Food Growing in the City of London can range, from commercial farming on the urban fringe to cultivation on allotment sites, land owned or managed by local authorities, greenhouses, market gardens, vacant and temporary sites, private gardens, windowsills and rooftops. (Growing Food, 2010) Approaches to food-growing include commercial enterprises, individual gardening activities and community food growing. (Petts, 2001)

**Global aspects (international trade)**

In terms of the global factors that influence the Urban Agriculture system, international trade is significant. The Planning and Housing Committee mentions in the report “Cultivating the Capital” that “Londoners eat 2.4 million tons of food, most of which is purchased from supermarkets and often imported from all over the world, but a certain amount, for example milk, vegetables and some meats, are sourced from within the UK. Continued reliance on food grown further afield makes London dependent on long supply chains and vulnerable to transport disruptions and fuel price increases. Other emerging issues such as climate change’s impacts on world food yields and the increasing demand of a growing world population on finite resources used for producing food may threaten future food supplies.” (Planning and Housing Comitee, 2010 p.13) Over a fifth of the vegetables and 86% of fruit Londoners eat, is imported and the trend is set to rise and with it immense environmental costs. (Ministry of Agriculture, 1997) To meet the target of more Urban Sustainability requires a strategy which raises the local food production, reduces import, and therefore reduces environmental impacts. Urban Agriculture in London is, among policy makers, mainly seen as a strategy for food production and it is less paid attention to the community or environmental benefits it provides.

**Urban aspects (population growth and densities, physical layout, employment levels, consumers’ tastes and market niches, legislation)**

The Urban elements and the built environment have a main contribution to the Urban Agriculture system within a city. It can give a reason how different typologies of Urban Agriculture developed through the urban situation of London.

London is located in the South East of England on the Thames River. The city is, based on the population, the largest city and capital of the United Kingdom as well as in England. It is
estimated that London will have by the end of 2013, 8,500,000 inhabitants and the population is constantly increasing. With a total area of 611 sq miles and a population density of 12,331 Londoners per sq mile is London one of the densely cities in Europe. This causes several environmental problems such as recycling of waste and bad air quality. (Greater London Authority) London’s ecological footprint is measured to be 125 times its surface area, requiring the equivalent of the entire productive area of Britain to sustain itself. The diversity of London and its dense structure as well as its population density requires high import and increases the dependence of the city to its hinterlands.

The area of Greater London covers around 157 800 hectares and is divided into 33 areas or boroughs, each run by a locally elected council which in turn is directly responsible to the national government. Since the year 2000, a new democratically elected Greater London Authority came into being, headed by a Mayor and guided by a Greater London Assembly. The Greater London Authority is responsible for strategic planning, transport, economic development and the environmental sustainability of the capital as well as for the sustainable development framework. (Greater London Authority)

Food growing in the City of London range, from commercial farming on the urban fringe to cultivation on allotment sites, land owned or managed by local authorities, greenhouses, market gardens, vacant and temporary sites, private gardens, windowsills and rooftops. (Growing Food, 2010) Approaches to food-growing include commercial enterprises, individual gardening activities and community food growing. (Petts, 2001)

The Green Belt

One specific urban element of London is its Green Belt. Influenced by Ebenezer Howards book “Garden City of Tomorrow” the vision of towns free of slums and the idea to connect the benefits of the city with the life on the countryside developed. His concept was based on the vision to balance individual and community needs and the facilities of a town with the advantages of its hinterland. (Reps)

Howard’s vision and the following Garden City Movement was the foundation for the Green Belt Strategy, which developed around 1955. The main idea of the green belt was to provide open space and prevent urban sprawl. The Planning Policy Guidance paragraph 1.4 states that: “the fundamental aim of Green Belt policy is to prevent urban sprawl by keeping land permanently open; the essential characteristics of Green Belts are their openness and permanence.” (Department for Communities and Local Government, 2012 p.2) Further the National Planning Policy Guidance PPG2 (Green Belts) paragraph 1.5 refers to “The use of Land in Green Belts”: 
“To provide opportunities for access to the urban countryside for the urban population
To provide opportunities for outdoor sport and outdoor recreation near urban areas
To retain attractive landscape, and enhance landscapes near to where people live
To improve damaged and derelict land around towns
To secure nature conservation interests
To retain land in agriculture, forestry and related uses” (Planning and Housing Comitee, 2010 p. 21)

Even if Urban Agriculture is named only in one point of the above objectives, it is obvious that, as mentioned due the literature review, it could contribute to all of them. Therefore the Green Belt offers a great opportunity for Community Gardening, City farms or other Urban Agriculture initiatives. Moreover it can be seen as a sill for a better connection between a city and its hinterlands. (Department of Environment, Development and Transportation, 1992)

However, London’s Green Belt has increasingly become London’s dumping ground and home to activities such as sand and gravel pits, refuse disposal sites, kennels, equestrian centers, golf courses and driving ranges and facilities for noisy sports as well as car-breaking, horse keeping, car boot sales, Sunday markets, car storage, motorcycle scrambling and caravan sites. (Department of Environment, Development and Transportation, 1992)

London’s Green Belt is under pressure of new development proposals. The high density requests land for new developments such as infrastructure, airports, transmission lines or new housing. Therefore Urban Agriculture use is given a lower priority among policy makers and planners in relation to other uses (Planning and Housing Committee, 2010) Referring to the Growing Food report, “Can the close proximity of urban fringe areas to customers guarantee fresher produce and keep ‘food miles’ to a minimum. Further urban areas offer a good potential market, with increased options of direct selling shops, restaurants and the public. Farmers markets provide benefits through face-to-face contact with producers. A farm location near a large centre of population not only increases potential consumers, but also access to a large workforce. Additionally there is the potential for ‘pick your own’ farms” (Planning and Housing Comitee, 2010 p. 17)

In recent years, pressure at the urban fringe, particularly from new development, has caused farming activity to become detached physically, economically and culturally from the urban population since 1949 landscapes on the edge of London defined as “urban” have increased while agricultural land uses have decreased. (Department of Environment, Development and Transportation, 1992)
But at the same time Howard’s idea of the Green Belt relates to a much bigger vision then how our cities actually developed and what the Green Belt actually presents. Many Fringe farmers nowadays face a lack of infrastructure as well as on the decreased availability of labor. Another aspect of the declining farming activity within the green belt is the decline in succession and problems with getting planning permission to diversify their activities in order to strengthen their economy. Referring to a survey, fringe farmers notice that better links between the major London food markets and the urban fringe farmers or developing a fair trade scheme in the UK could have positive effects. Additional farmers markets could provide a bigger platform not just for fringe farmers, to sell the products and get in contact with the consumers. What means personal contact between producer and consumer and experience exchange.(Planning and Housing Committee, 2010)

Since the focus on Urban Agriculture raises the question why London only uses 20% of the Green Belt area for Urban Agriculture, comes up. It is problematic especially in such a dense city as London to decide whether to use free space to built on new developments or for certain initiatives such as Urban Agriculture. At the same time work in the interest of London’s Sustainable Development Framework and therefore promote more Sustainability. But there is a high potential for more Urban Agriculture especially in the Green Belt area.

**Individual elements (education level, particular mix of occupations, farming skills, access to resources)**

Throughout history and with the ongoing transformation of cities, many new forms and new initiatives of Urban Agriculture within London evolved. Historical farm activities such as city farms and community gardens acquire a new purpose. Since the early days in the 1960’s a few groups of local people came together to convert patches of derelict land for gardening. Now there are 17 city farms and more than 100 community gardens in London. (Federation of City Farms & Community Gardens, 2012)

In 1972 the first city farm was established in Kentish Town, London and was basically influenced by the children’s farm movement in the Netherlands and the community garden movement in the United States. Nowadays many city farms are open to visitors or offer opportunities for volunteering, work training, or education. Especially the education coefficient makes the difference to earlier applications. Almost all city farms in London are affiliated to the Federation of City Farms and Community Gardens, a charity that works to promote and support community farming and gardening.

The initiative “Bold Vision” “*is a community led organization working together to make Telegraph Hill an even more amazing place to live.*”(Bold Vision, 2013) The vision is to strengthening the community and to create a community centre and associated programs.
The Telegraph Hill Community offers next to food growing places, garden and cooking workshops as well as coffee shops where the products can be sampled. Several projects, such as “Grow Wild” or “New Cross Learning” create a network with other Communities and initiatives and offer the chance for a stronger community. (ibid.)

While community gardening and allotments belong to the traditional, related to history, activities, the face of Urban Agriculture within London and in the world has changed. The so called “nouveau farmer” has emerged over the past 10-15 years. Often are they willing to revive remnant Urban Farms or find space within the confines of the built environment, to produce and sell food. Some of these farms are choosing this route simply because they cannot access rural farms due to high land prices or lack of available land. Many entrepreneurs, sometimes part of the collectives, are utilizing innovative growing methods to produce high yields in the small spaces they can find in the city. Unlike farmers of the past, these new farmers do not necessarily come from agricultural backgrounds. Especially the new kinds of farming, such as farming on vacant plots or on the rooftop, adapt too many urban challenges such as a highly dense city or even farming on vacant plots or using abandoned buildings as city farm can be a new chance for development.

With the “nouveau farmers”, green roofs become a common feature of new developments well beyond the city of London. Over the last 10 years, developers have discovered especially the commercial benefits of green roofs including lower maintenance costs and enhanced “let ability” of commercial developments. Referring to the “Bigger Picture” Report London is UK’s leading city in the drive towards green roofs.(Sustainable Development Unit, 2012) One main initiative involved in rooftop farming is the “Food from the Sky” initiative which is a pioneering permaculture food growing and educational initiative on the roof top of a supermarket which mainly grows fresh vegetables, herbs and fruits to organic standard. The products are harvested and sold below in the supermarket. The vision it has is “To grow life, food, and community in our most cemented places and to bring the heart back in our supermarkets!”(Food from the sky, 2013)Further the initiative is about inspiring and growing a healthy and sustainable relationship with food in cities and with supermarkets. The initiative has moreover established an alternative approach to food production and consumption, and it’s about building a 12 step template that can be easily used by other community groups, supermarkets and organizations. (ibid.)

The initiative “Food from the Sky” represents one of many initiatives referring to Rooftop farming. Rooftop farming represents a way of farming which is possible throughout the city without taking away any public spaces. It offers many opportunities, referring to the Sustainable City concept of the “compact city”. Rooftop farming would be the main solution for a high dense city to be more self-sufficient and to reduce transport. Among rooftop
farming it becomes really popular to have beehives. Some of London’s most famous landmarks such as the Buckingham Palace, Tate Modern or the Fortnum & Mason host beehives on their rooftops but beehives can be kept in different places such as allotments as well. But there are several arguments against keeping bees in urban settings and many in favor of it. Beehives can have a main impact on the environment but often it’s argued that they are dangerous to public health and well-being. (More than a Farm, More than Food, 2011)

One major “new” Urban Agriculture movement is aquaponics. It is the combination of aquaculture or fish cultivation and hydroponics or water-based planting: nurturing the plants and fish in symbiotic balance in urban locations. The basic principles of aquaponics are to grow fish and plants in a symbiotic balance, so the waste from the fish provides nutrients for plants and in turn the plants filter the water for the fish. Plant off cuts can then be composted in wormeries to provide food for the fish and so the cycle continues. Crops are constantly harvested and the system feeds and watering itself in a sustainable ecosystem approach to food production. The main advance of the Aquaponics is the “closed-loop” in the food production. (Backyard Aquaponics, 2012) It has the capacity to provide all inputs to the system within the system itself and to recycle its own wastes. Further it can be practiced anywhere. The ecosystem approach to farming lends itself well to conservation and development projects and also to education. Aquaponics are often found in FARM:shops, which is an “urban food “Hub”, café and arts venue complete with mini “aquaponic” fish farm, rooftop chicken coops, indoor allotments and polytunnel. The FARM:shops represent a new form of the traditional farmers markets. Visitors can see how the food is grown and be involved in the farming process. (A. Merritt; P. Smyth; S. Henderson, 2010)

FARM: and FARM:shops are devised and run by Something & Son LLP, an eco-social design practice, supported by several partner organizations and volunteers. It combines art, engineering and business know-how to find creative ways to improve the world around. FARM: was launched in 2010 to bring farming into the city and to develop a network of shops and grow sites across the UK. The aims of FARM: are to excite and inspire city dwellers to grow their own food, fabric and medicine and make an income doing this, to create direct links between farms in the countryside with communities in cities and to grow food commercially via a network of FARM:’s across cities and retail this food at FARM:shops. (A. Merritt; P. Smyth; S. Henderson, 2010)

This initiative represents the main idea of how Urban Agriculture and economic development can influence another. FARM: and FARM:shops also outline new innovative ways to incorporate economy and Urban Agriculture.
Another important activity which has developed out of activism and the perceived necessity to change urban structures is Guerrilla Gardening. The idea of Guerrilla Gardening has spread throughout the world and is in general a growing phenomenon. However, people often see the activism as controversial because the activities are secretive, technically illegal, can be subversive and aim to deliver a strong message to statutory authorities. But at the same time Guerrilla Gardening represents the growing interest in greening the city, the awareness of environmental impacts and raises the question of responsibility. It is popular in urban areas and its desire is to reclaim public space and at the same time encouraging communities to take action over their local environment. (Federation of City Farms & Community Gardens)

There is a trend toward the activity becoming more open, encouraging communities to take action over their local environment. The idea is to create change to enhance the local environment in a way that will excite the attention and involvement of local people. Guerilla gardening can take many forms such as wildflower gardens on barren roundabouts or where potholes in roads are filled with soil and planted flowers.

One campaign supporting Guerrilla Gardening in London is “Pimp your pavement”. The campaign was launched 2010 in London by Richard Reynolds and the campaign gives people the chance to take back responsibilities from local authorities. That can especially change the way authorities see their own responsibility and whether as residents, maintenance staff, designers or policy makers – change the way of looking at things. The new way of thinking throughout the citizens is in terms of the sustainable development quite necessary in terms to take responsibility, show respect, maintain resources and present results and be open minded for new initiatives and technologies. (Guerrilla Gardening.org, 2010 - 2012)

Richard Reynolds, founder of Guerilla Gardening movement, which adds flowers and fruit to disused spaces across the capital, has planted strawberries by Black friar’s bridge on the Thames and cabbages at Elephant and Castle in south London. His most recent project is to create movable gardens inside skips for scraps of land across cities. “It connects people to where food comes from,” he says (ibid.)

**V. Conclusion and future challenges**

This part of the paper summarizes the above presented results of the analysis of Urban Agriculture in London. The focus will be to answer the primary and secondary research questions. How does Urban Agriculture appear in cities? How did it evolve in its form and purpose and what are the main driving forces for the development of Urban Agriculture? What elements influence the Urban Agriculture System?
The analyzed global, urban and individual elements of the Urban Agriculture System in London, presents a comprehensive framework on the situation of Urban Agriculture in London. London’s food system is highly dependent on import, which is the reason for a high ecological footprint.

The first question to answer is how Urban Agriculture appears in the City of London, therefore I will reflect on how Urban Agriculture is picked up among policy makers, citizens and within initiatives.

Urban Agriculture in London captures a niche function. Within London’s municipality Urban Agriculture is basically a food growing strategy to support the overall Agriculture production. Indeed a way for sustainable food production. Among policy makers Urban Agriculture is a tool for a green and pleasant city which attracts new investments and offers the opportunities for new innovations especially in terms of new technology. But as already mentioned Urban Agriculture relates to more than only food security. A high amount of Urban Agriculture can make, to a certain level, independent form import and reduce transport and packaging costs. At the same time transport emission could be reduced which leads to an improved air quality within the city and relates to the climate change.

Among the citizens, the focus on Urban Agriculture grows and with it the awareness of environmental damage by chemical intense food production. About 14% of Londoners already grow food, about 30,000 Londoners are active allotment gardeners and there are more participating in other garden activities or often visit a city farm. Many organizations, such as the Capital Growth promote food growing, create networks between all kind of farmers and Urban Agriculture initiatives. The target is to connect commercial and individual farmers, volunteers, interested parties and activists to improve the Urban Agriculture activity and to benefit of the diversity of aspects Urban Agriculture represents.

Depending on the different activists and the different purposes they follow, the importance and presence of Urban Agriculture changes throughout the city. This results for example in the development of new Urban Agriculture spaces.

The initiative Capital Growth supported the creation of 2012 new community food growing spaces across London by the end of 2012. Further it offers practical help, training and support to people who want to grow their own food, whether at home, on an allotment or as part of a community group. The ideas represented by “Capital Growth” go mainly along with the problems individual growers actually face, like less available space or no education in farming. Among planners, Urban Agriculture is seen as a messy and incompatible business and therefore many planning policies do not involve Urban Agriculture as strategy. What makes it especially in a high dense city as London difficult to find new plots and expand the
Urban Agriculture network. Capital Growth as an initiative supported by London Food Link, the Mayor of London Boris Johnson, and the Big Lottery's Local Food Fund offer available space for Urban Agriculture and training in food growing, gardening, cooking and different workshops. But as mentioned, land is scarce in London and space is used for other development such as real estate.

A characteristic and historical existence, especially in London represents the green belt, which creates space and possibilities for Urban Agriculture. But the Green Belt Policy Guidance mentions that the Green Belt should retain land in agriculture, forestry and related uses as well as secure nature conservation interests. Drawing a scenario on an increasing Urban Agriculture production within the green belt can lead to less space for other outdoor activities as well as it can work against the purpose of providing an attractive landscape near to where people live because often Urban Agriculture is seen as a messy business and often farmers have problems with neighbors complaining about noise pollution and irritation through odor. Another question which rises is about the connection between rural and urban area. An increasing Urban Agriculture production throughout the Urban Fringe could lead to more development within the green belt and therefore the green belt would lose its main purpose of preventing from urban sprawl.

Another way of Urban Agriculture appearing through the city of London is through new forms such as rooftop farming or Guerilla Gardening. The constantly changing built environment London’s and the high density Urban Agriculture needs to be flexible and adapt to new situations. Rooftop framing in example refers to the need of more space within the city and represents at the same time a creative solution for Urban Farming within a highly dense city. A totally different and new purpose pursued Guerilla Gardening. It is not about food growing but it is using gardening as tool to call attention to different issues. Through Guerilla Gardening the initiators try to make people aware of the impact urban life has on the environment and that citizens often lose the sense of natural beauty within cities. Further the does the Guerilla Gardening want to call attention to policy makers and point out there responsibilities as well as nuisances like vacant buildings. Guerilla Gardening can have many forms and often takes place within an unexpected environment such as pavements.

This leads to the next question, how did Urban Agriculture evolve in its form and purpose and what are the main driving forces for the development of Urban Agriculture?

As already mentioned Urban Agriculture needs to adapt to new circumstances all the time. This is the reason why there exist such a variety on Urban Agriculture throughout London. Urban Agriculture always had an important role within cities. Back in history Urban Agriculture was basically a food growing business to overcome food shortage. Over time and
with the transformation of cities and lifestyle people experienced new ways and forms of Urban Agriculture such as rooftop farming or Guerilla Gardening. For many involved parties the food growing process is not the previous purpose as it was back in time. Back then Urban Agriculture was mainly for food growing especially among low income citizens. During the 1st and 2nd World War Urban Agriculture was promoted by many municipalities to provide additional food for the country. Nowadays community gardens are seen as a platform for citizens to get in contact with other people and build a strong community. The food growing process is secondary. There is no evidence that, especially in London, Urban Agriculture is managed through low income groups but it shouldn’t be excluded.

Another main purpose for Urban Agriculture nowadays is the environmental aspect and the necessity among citizens for organic grown food and a healthy lifestyle. Many “farmers” want to experience roots and old traditions. Furthermore it has a high psychological and physical input which contributes to the well being of Londoners.

Overall the ideas of Urban Agriculture are far away from the low-income citizens which used to farm to support their family. Urban Agriculture and gardening nowadays is not a main food growing strategy anymore moreover it is a new lifestyle.

The last questions to be answered: What are the main driving forces for the development of Urban Agriculture and what elements influence the Urban Agriculture System?

As Mougeot mentions, the main factors which influence the Urban Agriculture System are the global, national, regional, urban, district within the city, household and individual levels. An important role have London’s policy makers. They influence the financing and developing on the Urban Agriculture system. Many initiatives, which are supported by the municipality, do not finance any second hand projects. There exists different funding opportunities, communities can apply for, but those funds are not connected to Urban Agriculture. Often they are constructed to support better and stronger communities or to support Urban Sustainable Development or innovative ideas. By giving away those funds it is often paid particular attention how the projects fit into the sustainable development framework of London. Some Urban Agriculture projects were funded this way but often those projects and initiatives depend on volunteers and donations. Moreover policy makers often overlook the various economical, social and environmental side effects of Urban Agriculture. Urban Agriculture could be used as temporary use on vacant plots and abandonment buildings. This could lead to a revitalization of the land and within the neighborhood what results in a main contribution on the real estate market which therefore has an effect on the economy. The series of effects and reactions can be continued but the point is that Urban Agriculture isn’t an initiative that stands for itself. Moreover Urban Agriculture influences different
spheres and levels of the city of London. But as much as policy makers influence the Urban Agriculture System, Urban Agriculture still is a bottom-up process which finds its roots among citizens and the initiative they take. This shows the high amount on Urban Agriculture projects and initiatives in the city of London.

If London would use its many opportunities, and support Urban Agriculture even better, London could become a centre for horticulture and food excellence, and at the same time contribute to the global challenges and promote Sustainable Development. Many opportunities promoting Urban Agriculture in London are untried. For example London has a high amount on parks, which are often well used and valued but some parts are turning into no-go waste areas, perceived to be dangerous or simply unattractive with inadequate funding and poor management. (GREENHALGH, L. & WORPOLE, K. Urban parks and social renewal. Comedia/Demos, 1995) Urban Agriculture could make a better use of land which has already been designated as green space. And therefore be a potential area to turn those spots into productive gardens, producing food for local consumption and therefore promote food growing as a strategy. Expanding the Urban Agriculture network would not only provide new chances for citizens to experience Urban Agriculture, it would support the food growing strategy by the municipality as well. But as argued before takes Urban Agriculture a niche function but its compatibility is a matter of design and as new Urban Agriculture forms evolve Urban Agriculture contributes too many urban situations and processes within a city.

Future Challenges

The aim of this paper was to give a comprehensive analysis on Urban Agriculture in the context of Urban Sustainable Development. The theoretical chapter provided on overview on the conceptual and theoretical ideas of Sustainable Cities and Urban Agriculture. Further the perceived role of Urban Agriculture within Sustainable Cities was discussed. The case study method put the conceptual ideas of Urban Agriculture into a real context and the actual situation of Urban Agriculture in London was presented and analyzed.

Urban Agriculture within cities is increasing. More and more policy makers, environmentalists and citizens realize the different economical, social and environmental facets Urban Agriculture covers. This has lead to the idea that Urban Agriculture could be more than just a tool to overcome food shortage.

But instead of seeing Urban Agriculture as tool to improve economical, social as well as environmental concerns the interests are mainly different. Policy makers refer to it as additional food production strategy and to beautify the city while environmentalists argue about the environmental aspects such as improving the micro-climate within cities and habitat opportunities for wildlife. A mainly different focus on Urban Agriculture have the
citizens. The purpose for farming and gardening can vary among the citizens and it is difficult to generalize the different purposes. But there is an increasing trend of Urban Agriculture being used as community building tool, where the main focus lies on the community, the community network, meeting new people and share experience all under the aspect of Urban Agriculture.

There are no limits of Urban Agriculture initiatives. It includes several different activities such as tree replanting efforts, conversion of hundreds of miles of once-industrial urban waterfronts to parks and greenways and millions of acres of protected farmlands and forests; concerted efforts to build green schools in which children learn better; campaigns to expand locally based agriculture and farmers’ markets and decreasing the pollution from trucks carrying foods over thousands of miles. *(Peirce, 2006)*

Reflecting on the aim of the paper, it is important to mention the variety on economical, social and environmental aspects Urban Agriculture covers. For example, Urban Agriculture can improve the micro-climate and reduce the heat islands as well as filter the dust and function as a wind break throughout the city. Therefore Urban Agriculture can improve the physical climate of vegetation, increase humidity and introduce more pleasant odors to the city. Another main and important fact to increase urban sustainable development is the recycling and waste management through Urban Agriculture which at the same time close the open ended nutrient loops. The idea and how Urban Agriculture can contribute to a better city environment not only on a nature base also on a social and economic level can be continued but basically Urban Agriculture can be a partial solution to many problems urban areas face. As presented is Urban Agriculture not only about food security, moreover it is about connecting people to the land by giving them the chance to grow their own food, it is about health and nutrition as well as food quality and Urban Agricultures environmental, economic and social benefits. But how Urban Agriculture finally appears throughout the city depends on multiple factors. How is the urban environment constructed, what strategy do policy makers follow with Urban Agriculture or how ambitious are the citizens? In addition is each city different and refers to individual factors such as London’s Green Belt.

It is not obvious if the ongoing global challenges and the paradigm shift within Urban Agriculture is connected, but as the paper presents, Urban Agriculture always adapted to new circumstances within cities. The variety on typologies and forms Urban Agriculture can take, offer many opportunities to adapt to the built environment of a city as well as to a variety of political purposes. Because of this, it seems there is an opportunity to connect the challenges cities face with sustainability issues to make an even more compelling case to planners and stakeholders for supporting Urban Agriculture.
Policy makers have a basic influence on the Urban Agriculture System as well as citizens. The empirical study showed that the assumptions for better integrated Urban Agriculture within cities a good cooperation between bottom-up and top-down processes. Often the interests among the population and policy makers are quite different. Urban Agriculture is among planners seen as a “dirty and messy” business and especially in dense cities not worth the space that could be used for development especially in dense cities.

As in the theoretical perspective presented does Urban Agriculture relate to the main concepts and ideas of a Sustainable City but in practice it is uncertain what to expect and how it will develop in the future. The first step would be to realize the overall effects of Urban Agriculture and to develop a strategy that would support not only Urban Agriculture but its different effects. It could become an improved community tool, a strategy for a better waste management and a different form of healthy food production.

As the habitat agenda mentions “the economic, social, political and environmental futures of the Earth will depend on how urban issues are addressed; local and national institutional and financial capacities have to be strengthened to address urban issues. Finally, best practice and indicators were highlighted as the most innovative instruments towards urban sustainability.” (European Foundation for the Improvement of Living and Working Conditions, 1998)
VII. Bibliography


