THE QUALITIES OF URBAN AGRICULTURE TO OVERCOME THE URBAN CRISES

A case study of London during urban poverty, war, and the climate crisis in 20th - 21st century

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Abstract

This thesis examines urban agriculture as a tool in city planning to overcome a different form of urban crises, such as urban poverty, war, and climate crisis. By examining those specific crises based on historical events, I define agriculture integration strategies in urban planning and their effectiveness to restructure the urban fabric to overcome the different forms of urban crises. The city of London is a case study that is investigated at three specific moments; the early 1900s, during the First and Second World War, and from 1970 to the present. The first part of the research analyses the concept of 'Garden Cities' (1902) created by urban planner E. Howard to overcome urban poverty. The second part investigates 'Victory Gardens' and the 'Dig for Victory' campaigns that were introduced to cope with the food shortage during both World Wars. The last part of the thesis explores sustainable cities concepts created in the 70s and the theory of Continuous Productive Urban Landscapes (2004) to overcome climate crises. In addition to this, I am mapping London's agriculture fields, community gardens, and allotments at each section of the research that monitors the changes of physical connection between food cultivation and urban areas. The analysis defines three main strategies of agriculture integration into urban planning: zoning line; integrated into the urban areas; intermixed with the urban fabrics. Those urban planning strategies have qualities to restructure the physical environment, the ecological, socio-cultural, and economic structure of the city.

Content

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Chapter 1: Introduction

The topic of urban-rural duality is high on the agenda of architects, landscape architects, and urbanists. Most of them are stressing out the physical relationship between the city and rural areas, as seen in the concepts of 'Linear City' (1882) by Arturo Soria y Mata, 'Broadacre City' (1932) by Frank Lloyd Wright, and in the theory of 'landscape urbanism' (1994) appeared in the work of Peter Connolly. Those concepts share the idea of merging the boundaries between urban and rural areas. Urban agriculture is an important asset that can help to become self-sufficient, build communities, and offset the negative impact on the environment.

Looking at the urban history of the 20th-21st century, it is noticeable that the integration of agriculture in urban planning is often reintroduced and implemented in some ways or another during the various urban crises, such as rapid urban growth, urban poverty, war, and climate crisis. For example, the 'green belt' has been introduced to control urban sprawl that has been rapidly increasing after the industrial revolution. During wartimes significantly increased the number of allotments and community gardens to secure food supply. Lastly, the climate crisis forces us to rethink urban agriculture in city planning again. This thesis hypothesizes that urban agriculture is a significant instrument in urban planning that helps to restructure the urban fabric to overcome the different forms of crises.

The historical research will help to define the urban agriculture parameters and their effectiveness that could be used in urban planning to build resilience in our cities, which is urgently needed to overcome our current global crisis (climate, pandemic, immigration, and financial crisis). To proceed with this research, the city of London has been selected as a case study, because London often has been confronted with complex urban problems first out of other metropolises. This occurred simply because of its size. London was the world's largest city for almost a century since the city reached its population of six and a half million in 1901 (Hepp, 2015). Moreover, as described by urban historian John Hepp in his paper 'London as an Urban Model since 1666', the city had a key role in a global urban model. This makes London a suitable case study to investigate the role of urban agriculture in city planning during urban crises throughout the 20th and the 21st centuries.

The city of London will be investigated at three specific moments; the early 1900s after the second industrial revolution, during both World Wars, and in the 1970s when sustainability awareness rose. First, will be analysed the concept of 'Garden Cities' (1902) created by urban planner Ebenezer Howard to overcome urban poverty. The second part will investigate 'Victory Gardens' and the 'Dig for Victory' campaign which was introduced to cope with the food shortage during the First and Second World Wars. The last part will explore sustainable city concepts created in the 70s and the theory of Continuous Productive Urban Landscapes (2004) to overcome climate crises.

All three parts of the research will rely on the literature review. The primary recourses of each section as follows:

1. Garden Cities of To-morrow (1902) by E. Howard
2. Cultivating Victory: The Women's Land Army and Victory Garden Movement (2013) by C. Cowdy-Wygant
3. CPULs Continuous Productive Urban Landscapes: Designing Urban Agriculture for Sustainable Cities (2005) by A. Viljoen, and J. Howe.

In addition to this, will be mapped the locations of London's agriculture fields, community gardens, and allotments at each section of the research. Interpretative maps will monitor changes in the physical connection between food cultivation and urban areas at those three time fragments.

Chapter 2:
The qualities of urban agriculture to overcome the urban poverty: London in 1900-1914

The second industrial revolution shifted society from agrarian to industrial causing a large part of the population to move into the cities. As a result, the city of London reached its population of six and a half million by 1901 becoming the largest metropolitan in the world (Hepp, 2015). Unfortunately, this rapid growth led to the development of slum areas around the city. Unbearable living conditions of the working-class became a public concern that forced to look at town planning strategies. The key element to resolve poverty was suggested to rethink the relation between urban and rural areas.

Urban issue - poverty

Urban poverty was the most disrupting issue in the city of London since the mid 19th to the early 20th century. The rapid immigration from rural to urban areas, housing shortage unemployment, and increasing land price caused the development of slum areas at the edge of London.

The fast-growing population and housing shortage have created the overcrowdedness issue in the city of London. In 1901, the density of the administrative county of London was 60.6 people per acre and many boroughs of London exceeded 100 people per acre; Southwark 182, Shoreditch 180, Finsbury 172, Bethnal Green 171, and in Stepney 169 people per acre (Cherry, 1979). Unquestionably, the poorest boroughs were also the densest areas with poor living conditions (see Map 1). Referring to Gordon E. Cherry's work 'The town planning movement and the late Victorian city' he wrote that the town exceeding over 25 people per acre could not be considered as healthy. To stress this, even more, to understand the density issues city had experienced, the comparison between current situations of London could help; the density of inner London is 43.7 per acre and Greater London 22.25 (GLA, 2016).

The rapid urbanization significantly raised the value of land, especially in the central districts. This was a direct cause for slum area development at the edge of the city of London (Cherry, 1979). Also, the high demand for affordable housing and unregulated builders' works led to the construction of cheap, low-quality buildings that were inadequately settled and usually without drainage or ventilation. Moreover, those houses were too large for the

working classes to afford, and quickly after they were built was turned into tenements turning into heavily occupied neighbourhoods (Dyos, 1967).

Massive poverty throughout the city of London with a combination of low income, irregular employment, unsanitary housing conditions, poor diets, and physical unfitness raised concerns about the urban population (Cherry, 1979). By the early 20th century, the British government attempted to correct the issue of unsanitary living conditions by imposing laws and acts to regulate the private housing market and prevent future unsanitary housing developments. This includes Public Health Act that was established in 1875 to solve sanitary and water supply problems; Housing of the Working Classes Act 1890 to eliminate the slums areas; and Housing, Town Planning, &c. Act in 1909 banned building 'back to back' houses.

Agriculture in the urban model

The poor living condition of chaotically sprawling London pointed to the necessity to take the phenomenon of urbanization into control. As mentioned previously, new legislations started to emerge to ensure that urban areas would apply to health standards set by the government. In addition to this, to overcome complex industrial city problems the new ideas and typologies of city planning schemes have appeared, such as 'garden cities', 'garden suburbs', and 'green girdle'. The most distinct element in those schemes was that rural areas were used as a beneficial element in the city planning to improve urban masses. Towns with open green spaces were seen as a healthy alternative to the dirty, polluted and overcrowded city. Furthermore, it can be identified two main dualities of function and interconnection between rural and urban areas, such as separated-integrated into the urban planning and productive-recreational purpose of rural areas.

'Garden city' was the most influential town planning concept that had the biggest impact on London's urban planning, including many other cities in the UK and worldwide. This concept was developed by Ebenezer Howard first released in 1898 as a *'To-Morrow: A Peaceful Path to Real Reform'*, and republished as a *'Garden Cities of To-Morrow'* in 1902 that later evolved as a garden city movement.

With this concept, Howard spread the idea that qualities of the city and country should be combined into a 'Garden City' that has social and economic opportunities with healthy living standards. The new towns were proposed in a size of 30 000 people with industrial areas and the 'green belt' wrapping around the town. The purpose of the 'green belt' was to constrain the town from expanding its territory and at the same time

to supplying the town with food by designating land to allotments, farms and cow pastures (Howard, 1902). Although, agriculture is an essential component of the town in the concept of 'Garden City', it is physically separated by strict zoning. Agriculture is the last layer of the town that is separated from the rest of the city with the road infrastructure.

Furthermore, Howard suggested that the land for a new garden city could be purchase through investors with the mortgage interest rate not exceeding £4 percent. The revenue will be generated from the land rent that will be used to pay off the mortgage and fund the city to create/maintain public roads, schools, parks, etc. In this concept of co-operative land holding, the increasing land value would benefit the community instead of private individuals (Howard, 1902).

In other words, E. Howard was proposing the controlled decentralisation of the population to move to the self-contained towns that are free of slums with social and economical opportunities and healthy living standards. Even 'Garden City' concept was a solution for the city of London, the garden city movement spread worldwide.

The first garden city was Letchworth designed in 1903. The principal urban planners were Barry Parker and Robert Unwin that translated the 'Garden Cities' concept into the master plan (Cabannes & Ross, 2018). However, the architects designed Letchworth garden city with a more organic layout, opposite to Howard's design of strict function zoning and symmetric design (Cabannes & Ross, 2018).

Garden suburbs had a different concept; they were built on the outskirts of the city of London as low-density suburbs with large green spaces, but without the industrial and agricultural infrastructure that made them easy to implement. The green spaces had the purpose of recreation for the residents that work in the city.

Parallel to 'Garden Cities' the concept of 'green girdle' around London had been proposed by Lord Meath in 1890 and published by William Bull in 1901. The proposal suggested having a half a mile wide suburban parks and opens spaces with farming fields on the edge of build-up London. Furthermore, in 1911 George Pepler proposed that 'green girdle' should be similar to the ring road idea and further from the centre of London. Those concepts influenced the future proposal of the 'Green Belt' by Patrick Abercrombie that the government accepted to implement in 1946. Abercrombie's 'Green Belt' function was the same as Howard's; to use the land for farming and restrict urban growth (Thomas, 1964). However, besides the government's implemented laws to regulate housing development was no other planning

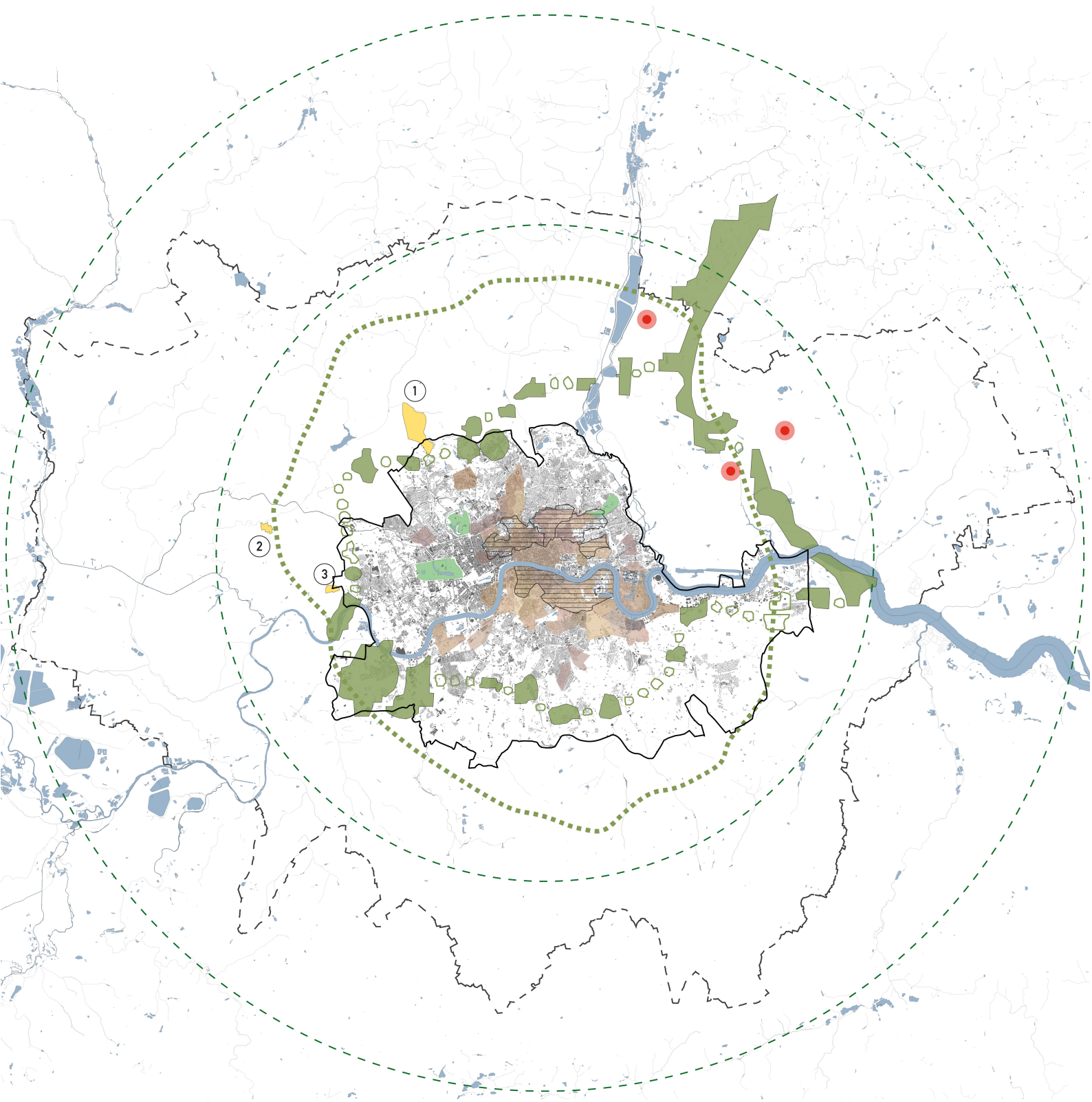
strategies were implemented in the city of London to overcome poverty.

Quality of urban agriculture

Introducing agriculture into city planning played an important role to improve the urban environment. As we looked previously from the distance, at the master plan scale, rural areas have the quality to stop the city from sprawling and to control the density. In addition to this, Howard has seen agriculture as a tool to stimulate the city's economy and to become more self-sufficient that he considered an essential element in creating healthy cities.

The city of London by the early 20th century became a densely built-up metropolis. The narrow spaces between the buildings hardly allowed the sunlight or circulation of fresh air into the city. Moreover, buildings were covered with the soot that was coming from industrial areas and the steam trains. The combination of country and city elements was seen as a solution to improve the environment. The rural landscape within the urban areas breaks the density and brings fresh air into the city. (Howard, 1902)

Furthermore, Howard has seen agriculture as an asset to the city that has a quality to prevent poverty. Urban agriculture provides stable job opportunities, generates profit, reduces the cost of food, and gives the opportunity to build self-sufficient. The significant element that has to be taken into account is that agricultural land, large farms, smallholdings, allotments, cow pastures, etc. must be held by various individuals to create a competitive market that relies on one holder (Howard, 1902).



Map 1. Mapping food cultivation in London (1900-1914)

Chapter 3:
The qualities of urban agriculture to overcome war: London during World Wars, 1914-1945

During both World Wars, food supply disruption caused a food shortage throughout the United Kingdom. To manage this crisis, the government introduced a food rationing policy and launched 'Women's Land Army' and 'Dig for Victory' campaigns to encourage people's participation in the war effort by cultivating the land. Consequently, empty urban spaces, bomb craters, and parks were turned into pop-ups of vegetable gardens to provide families with extra food. Gardening became a spirit of the nation that gathered people together, helped to build resilience to a food supply shortage, and even empowered the women's rights movement. Therefore, post-war reconstruction proposals raised the urge to re-plan London into a healthy, resilient, and self-sufficient city.

Urban issue – food crisis

On the eve of World War, Great Britain relied on food imports to sustain the country. This insufficient food supply system made the country vulnerable during the marine disruption. To deal with this issue, the government took control of imports, home production, distribution, and food consumption. In addition to this, the government implemented a food rationing policy and launched campaigns to increase agricultural efficiency in the country.

Prior to the First World War country was importing 50% of the required food supply to sustain its population (Gowdy-Wygant, 2013). This was disrupted by Germany's submarine warfare that caused food shortage throughout the country. The same scenario repeated in the Second World War when imports were held by a naval blockade. This time, the country was importing 70% cheese and sugar, 80% fruits, 90% cereals, and 50% meat, making in total almost two-thirds of national food being imported (Ginn, 2012). To overcome food shortage, the Ministry of Food introduced a rationing system that was based on individual flat-rate policy. This meant that each person can to consume an equal share of the national food supply. During the First World War, the rationing of sugar, fats, and meat started from 1918 till 1920. The second rationing (1939-1954) introduced soon after the outbreak of the Second World War was gradually strengthened by adding additional products such as cereals, tea, preserves and cheese. (Zweiniger-Bargielowska, 2002)

Ministry of Agriculture launched agriculture stimulating campaigns to increase local food production. Women's Land Army (1917) campaign was promoting women's workforce in agriculture to replace men that were called-up to the war. In the Second World War was launched 'Dig for Victory' (1939) campaign that was encouraging domestic food production by enabling people to use every possible piece of land to cultivate food (Gowdy-Wygant, 2013).

Agriculture in the urban model

The necessity to grow your own food transformed city into a temporal set-up of vegetable gardens. Due to the food shortage, government authorized people to use any available space including railway edges, ornamental gardens and lawns for private food cultivation. Even some sport field, golf courses and parks were hosting community gardens (Gowdy-Wygant, 2013). For example, demonstration allotments were incorporated into in Regent's Park, Zoo garden, and in the Kensington Gardens for an educational purpose and to show an example for the community (Seifalian, 2016). However, these were only temporal arrangements without any planning or strategy that was dismissed as soon as the food supply system recovered.

Moreover, the allotments that were mainly provided in the rural areas become high in demand in the cities. Due to this, the act of 1925 required that provision of allotments should be in every town scheme. This resulted in the increased number of allotments in urban areas, especially during the 'Dig for Victory' campaign. Furthermore, with the physically getting closer to the urban areas allotment changed its purpose as well. Originally allotments were doles of land for the labouring poor, subsistence for a large family when farm labourers' wages were low, became recreational spaces for a city people that demanded more community amenities. After the Second World War, the number of allotments was decreased. (Thorpe, 1970)

The tragedy of the First and Second World War brought the discussions about the city's resilience and self-sufficiency. Furthermore, the post-war reconstruction of Greater London was seen as an opportunity for re-organising the city to resolve the negative effects of unplanned urban growth that caused poor housing conditions, overcrowding, pollution, and public health issues. In 1944 Greater London Plan, Patrick Abercrombie addressed those issues by proposing the implementation of green wedges that stretched out of the 'Green Belt' into the city centre. Green wedges had the role of bringing sunlight and fresh air to the city, connecting urban areas to the countryside and providing recreational spaces. Moreover, open spaces can connect and at the same time separate areas that

were seen as a strategy against air raids and the demise of a large population, proliferation of fire as well as congregation points and escape routes. Also, green wedges can become allotments to support the food supply. (Oliveira, 2015). Unfortunately, the master plan was not implemented due to the post war economical crisis and the focus on housing issues.

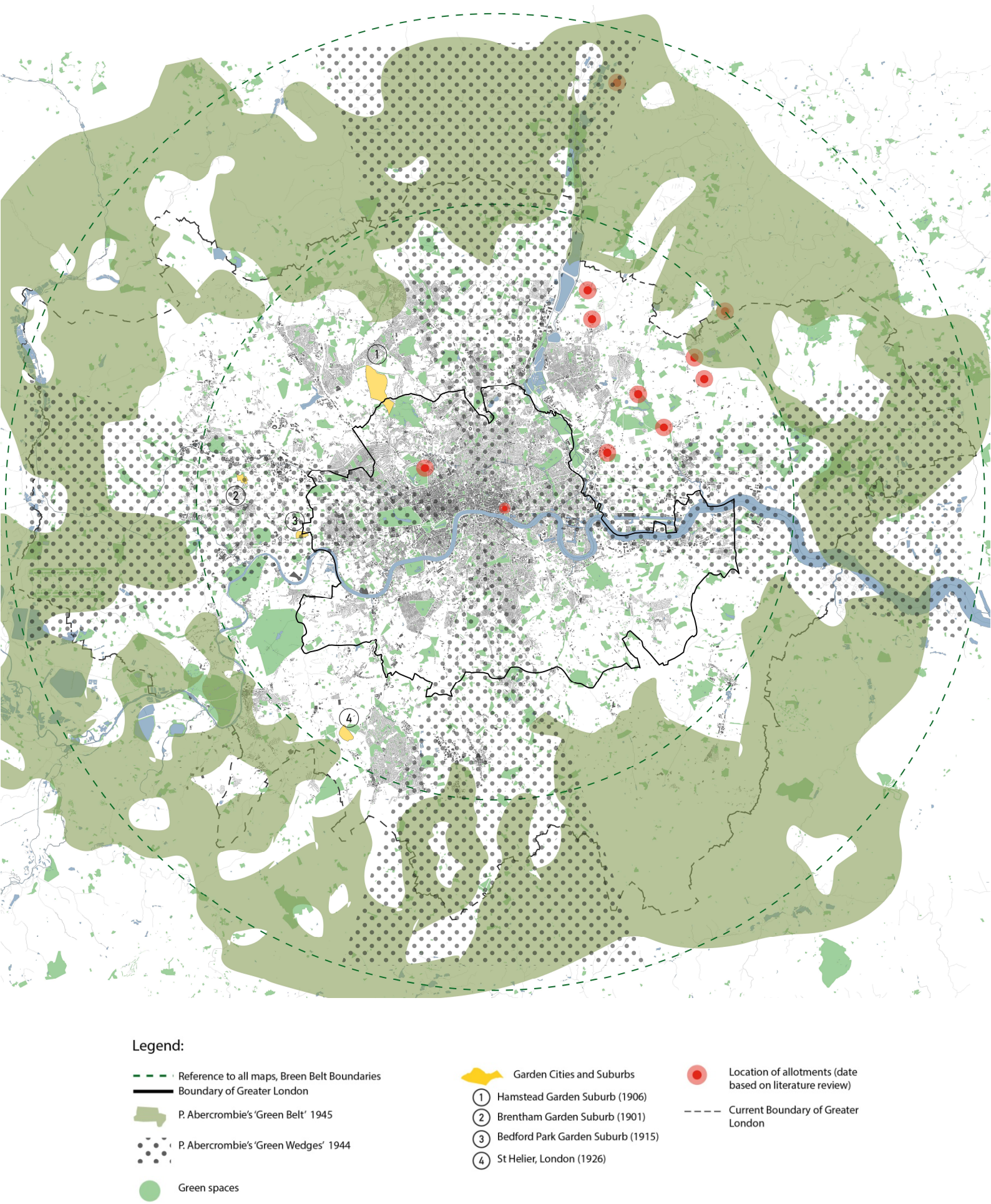
Qualities of urban agriculture

First and Second World War temporal set up of urban agriculture brought the qualities such as the ability to build resilience, unite the people, and empower social changes. Urban agriculture was a valuable asset in securing the food supply that helped to overcome the disruption of imports during the war. Furthermore, food cultivation was a common duty that people shared despite their social status differences. In this way, vegetable gardens become part of the social gathering as well as a recreational activity. Moreover, women's position in agriculture empowered the movement for female equality.

The British government used urban agriculture as a tool to build food supply resilience during both World Wars. This is similar to Howard's concept where agriculture was an essential element in urban planning to overcome poverty. Only this time the scale of impact is way larger; urban agriculture is not only the source to provide extra food for individuals that experienced low wages or unemployment but also the source to feed the entire nation that war victory depends on it (Ginn, 2012). The government was using propaganda campaigns such as 'Dig for Victory' as an educational program to teach people about agriculture. Although, Franklin Ginn argues in his work *'Dig for Victory! New histories of wartime gardening in Britain'* that propaganda took people's autonomy by pressuring nation to grow determined vegetables in the specified order without leaving the free choice to people. Nevertheless, the domestic vegetable production increased over six million tonnes per annum by 1943 (Ginn, 2012), ultimately this result would not be achieved without campaign.

The necessity to produce food was a common duty that brought all citizens together despite their social status. Although, prior to WWI food cultivation was associated with rural areas and poor labouring. In contrast to this, gardens with decorative landscape were seen as leisure and social gathering space for England's elite. The wartime food shortage merged these two aspects. The ornamental gardens have been transformed into vegetable gardens and food cultivation was no longer identified to the lower class (Gowdy-Wygant, 2013). Furthermore, the allotment gardens became a social gathering place.

Moreover, agriculture had a significant impact on social changes. Traditionally male managed agriculture industry shifted to women's dominance. The pressure of food shortage urged the government to organize female workforce to sustain the country. Furthermore, the organization such as Women's Land Army and Victory Gardens was established to promote women's space in labour and society. This open new career opportunities for women's and led to the social and political moment of female equality (Gowdy-Wygant, 2013).



Map 2. Mapping food cultivation in London (1914-1945)

Chapter 4

The qualities of urban agriculture to overcome the climate crisis: London 1970 - current

The mid-1960s has raised a new public concern – climate change. It is a consequence of social and economic changes that occur after the Second World War, including rapid population growth, accelerated industrialization, and enormously increased consumption. Furthermore, advances in technology developments had the effect of the expansion of industrial plants, electrical generating utilities, highways, airports, land mining, and the construction industry. Those activities pollute and disrupt the ecosystem causing the extinction of many species. The negative effect of human activities raised the awareness to protect the environment, especially after the events such as the Torrey Canyon oil pollution disaster in 1967 when damages were visible straight away (Hays, 1981). This forced architects and urbanists to look for sustainable alternatives to polluting cities.

Urban issue – climate crisis

The rapid population growth and increasing consumption raised the question of what is the limit that Earth can support, as seen in the report, *'Limits to Growth'* published in 1972 by the group of scientists and academics, Dennis Meadows, Donella Meadows, Jorgen Randers, and William Behrens III. In this report, they are pointing out the issue that usage of non-renewable resources and pollution cannot continue in the same way and humans must take action to reduce the ecological footprint.

Growing Population is one of the main contributors to climate change. In the *'Limit to Growth'* report, it is stated that if the exponential growth will continue to accelerate at the same speed the limit of growth could be reached in approximately a hundred years (counting from the publication date this would be in the year 2072). The increasing population is a direct outcome of the expansion of urban areas, increased energy usage, and recourse depletion (Meadows et al, 1972).

The increasing population is demanding more food, putting pressure on the agriculture industry to increase its productivity. As an example, achieving a 34% increase in the world's agriculture productivity from 1951 to 1966 demanded 63% expenditure of agriculture machinery, a 146% increase in usage of

fertilizers, and 300% usage of pesticides (Meadows et al, 1972). Such agricultural productivity increases require a lot of recourses and industrial activities that contribute to climate pollution.

Furthermore, industrial agriculture that uses chemical fertilizers, pesticides, and machinery based on fossil fuels is causing rapid soil erosion, fertility depletion, and land contamination. Land degradation disrupts the stability of the agriculture industry and demands the expansion of new arable land (Meadows et al, 1972). Also, referring to the *'Limit to Growth'* arable land is not an unlimited resource; there are about 7.86 billion acres of land that is suitable for agriculture worldwide.

Long-distance food trading leaves a large ecological footprint. London imports grains from Canada and United States, lamp from New Zealand, frozen fish from the Atlantic, and fruits from Spain, South America, and West Indies that comes by freighters, airplanes, and trucks. This long-distance food transportation demands high-energy usage and large quantities of fossil fuels that have a greater contribution to the world's pollution (Viljoen et al, 2005). According to the Greater London Authority in 2003 London's ecological footprint was 48,868,000 gha (global hectare that is 1 hectare of world-average biologically productive land) or 6.63 gha per capita. In this calculation, food counts 41% of the total ecological footprint (GLA, 2003).

Agriculture in the urban model

The climate crisis forces architects and urban design theorists to rethink the division between city and countryside ones again. This time agriculture is not a tool to control the growth of the city as it was around the turn of the 20th century, but opposite to this, to merge the rural and urban areas into one continuous landscape. Moreover, this new vision of the city changes people's lifestyles where urban food cultivation is a key element of sustainable living.

With the raised public environmental concern emerged new concepts of the sustainable city. The term eco-city first time used by R. Register in his book *'Ecocity Berkeley: Building Cities for a Healthy Future' (*1987) suggested that eco-city is a solution to the constantly growing, polluting, energy and resources depleting cities. Register described eco-city as a healthy city that is compact, pedestrian orientated, with diverse functions, and cooperative communities where humans live in coherence with nature (Register, 1987).

Another example of the sustainable city concept is Arcology created by Italian architect P. Soleri that was also the inspiration for Register (he used the image of Soleri's Arcology concept in his book *'Ecocity Berkeley: Building Cities for a Healthy Future'*). The first Arcology city, Arcosanti in Arizona,

was started to build in 1970 by Soleri himself and a group of voluntaries.

The most distinct group of sustainable architecture, social and political activists in UK, were Street Farm, a London-based collective of eco-anarchists Peter Crump, Bruce Haggart, and Graham Caine founded (1970). They were raising the awareness of sustainable living, organic agriculture, and the use of 'liberated technology' (alternative technology). Moreover, Street Farm was stressing out the ecological consequences of commercial mass production and population growth. The group was promoting the idea of 'revolutionary urbanism' to transform urban living to the sustainable and green cities that are in control of ordinary people (Hunt, 2014).

According to the group, the streets must be reclaimed from the cars and should be used for food cultivation as well as many other available spaces in the city. Street Farm was participating in the protests like Oxford Street blockage in 1971 to encourage urban changes. Also, they were participating in squatting empty plots for food cultivation in London (Hunt, 2014). Although, the idea looks similar to the 'Victory Gardens' the differences are that Street Farm was promoting food cultivation as a permanent element of the city and part of the sustainable lifestyle, opposite to the 'Victory Gardens' that was a temporal set up to overcome the temporal crisis.

The concept of merging urban and rural areas came up again in the 90s, this time with the new term 'landscape urbanism'. James Corner, landscape architect describes 'landscape urbanism' as a method for designing the open-endless, intermixing, and cross-disciplinary living ecology (by living ecology he meant the city) (Corner & Hirsch, 2014). This new open and edgeless city landscape idea also captured in the theory of the Continuous Productive Urban Landscapes (CPULs) first time used by Andre Viljoen and Katrin Bohn in 2005. CPULs are urban spaces that are combined with agriculture and other landscape elements without separation from rural areas (Viljoen et al., 2005). According to Viljoen and Katrin, CPULs strategy can health to achieve green, healthy, and economically stable cities with zero net pollution.

Even London is still far away from the continuous productive urban landscape concept, there is a visible beginning of transformation towards a sustainable city. For example, eco-city project BedZED in Hackbridge designed by Zed Factory architects (completed in 2002) is a pioneer project of eco-efficient housing estates. Furthermore, the allotments and city farm popularity is growing and more people want to be involved in food cultivation (Viljoen et al., 2005). See Map 3 with the latest agriculture fields, allotments, and city farms in London.

Qualities of urban agriculture

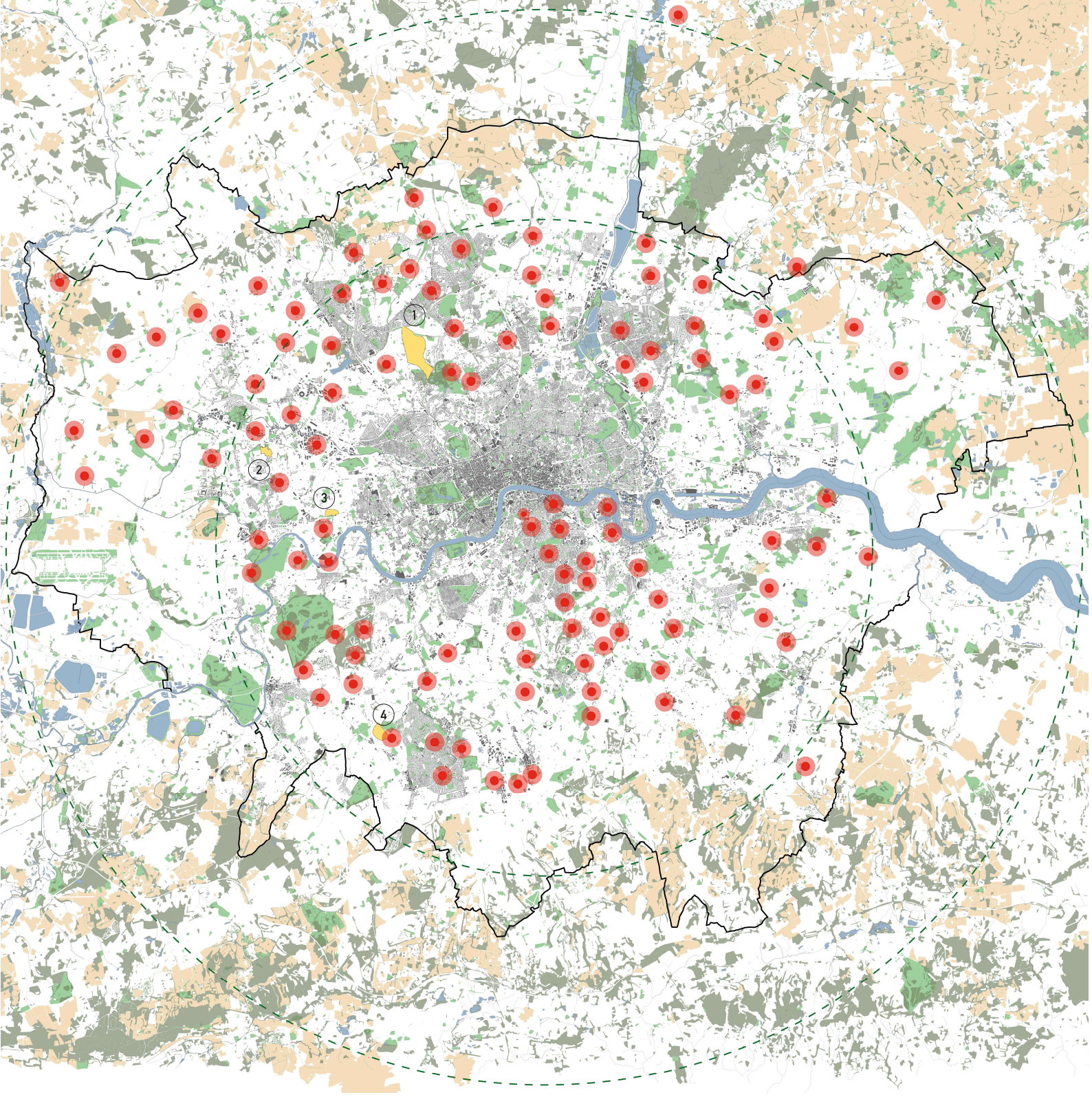
Merging rural and urban areas has numerous qualities that can help overcome the climate crisis. Urban agriculture has a significant contribution in reducing the cities' ecological footprint. Moreover, urban food cultivation has a quality to encourage a closed-loop economy, increase biodiversity, manage stormwater, and reduce urban heat.

Agriculture integrated into the city physically reduces the distance between consumer and food cultivation that directly cuts down the food miles. This reduces environmental damages that occur during chemical treatment to keeping food last longer, packaging, transportation, and storing. Moreover, organic food cultivation has a quality to bring awareness that eventually could shift the economy towards sustainable business models. This would have a significant contribution in reducing the cities' ecological footprint (Viljoen et al., 2005).

Urban agriculture can help to close the nutrient loop. Cities consume lots of food that most of its waste is not recycled. Urban food cultivation would encourage composting organic waste and returning nutrients to the soil. This would enrich soil fertility and preserve land from degradation (Meadows et al., 1972; Mougeot, 2006).

Furthermore, urban agriculture has a quality to increase biodiversity. Firstly, plants and trees planted in the urban farms, allotments, and gardens support the wildlife habitat. Secondly, food cultivation closer to the consumer makes it possible to use different crop varieties. At present, long-distant food trading demands specialization in the particular crops that have good travelling characteristics and long shelf life, not necessarily ones that have the most nutritious. This industrial agriculture system is a direct outcome of disappearing many crop varieties. For example, we had 287 varieties of carrots in 1903; today left only about 21 (Viljoen et al., 2005).

Urban agriculture integrated into the urban areas helps manage stormwater and reduce urban heat. Densely build-up and fully paved cities with heavy traffics creates an urban heat island effect. In addition to this, covered cities' surface does not absorb rainwater and frequently causing failure of the rainwater sewage system to take the rainwater out of the cities. Urban farms, allotments, and gardens similar to open green spaces absorb rainwater and prevent flood disasters. Also, plants and trees provide shade and reduce the urban heat (Pearlmutter, 2017).



Legend:

- Reference to all maps, Breen Belt Boundaries
- Boundary of Greater London
- Green spaces
- Farm lands
- Forest
- Garden Cities and Suburbs
  1. Hamstead Garden Suburb (1906)
  2. Brentham Garden Suburb (1901)
  3. Bedford Park Garden Suburb (1915)
  4. St Helier, London (1926)
- Location of allotments (date based on literature review)
- Current Boundary of Greater London

Map 3. Current food cultivation in London

Chapter 5

Conclusion

This thesis has investigated urban agriculture integration into city planning and its qualities to restructure urban fabric. The research focused on three specific moments in London's history: the early 1900s when London was facing urban poverty, the First and Second World War, and climate change, then awareness arose in the 70s. As we went through the 1900s to the current situation, we can recognize different urban agriculture setups in the city planning, such as **a strict zone** around the city, **integrated** into the city, and **intermixed** with the urban fabric. Those three strategies to integrate agriculture in urban planning differently affect the physical environment, the ecological, socio-cultural, and economic structure of the city (Map 4).

At the turn of the 20th century, the rapid expansion of the industrial city of London led to the development of slum areas around the city. The unbearable living condition of the working class became a public concern. Specifically to address this issue, E. Howard proposed the 'Garden Cities' concept in 1902. With this concept, Howard suggested the controlled decentralisation of the population by moving people to the self-contained towns (Garden Cities) outside London. To prevent new towns from the issues that London was facing at that time, such as poverty, overcrowdedness, and unhealthy living conditions, Howard integrated agriculture in urban planning. He implemented agriculture as **a strict zone** around the town, also known as a 'Green Belt', which function was to stop the town's territorial expansion. This new concept influenced future proposals, such as 'Green Girdle' by G. Pepler (1911) and 'Green Belt' around London defined by P. Abercrombie that was implemented in 1946. Furthermore, another reason for bringing agriculture into the city was that urban farming has a quality of helping to build self-sufficiency and stimulates the economy to overcome poverty.

During both World Wars, food supply disruption caused a food shortage throughout the United Kingdom. To manage this crisis the governmental campaign, such as 'Women's Land Army' and 'Dig for Victory' was launched to encourage people to participate in food cultivation. The necessity to grow food transformed the city into temporal pop-ups of vegetable gardens. Even this was a temporal transformation it brought the firsts permanent setups of agriculture in the urban areas. For example, allotments before the First World War were associated only with the

rural areas that became popular in the city as recreational gardens after the Second Ward War. Food cultivation during both wars showed that urban agriculture has a quality not only to provide food but also to bring people together and even empower social changes. Furthermore, the tragedy of both World Wars forced architects and urban designers to question the city's resilience and self-sufficiency in the cities reconstruction plans, as we saw in Abercrombie's Greater London Plan (1944). He proposed 'Green Wedges' that stretches out of the 'Green Belt' into the city centre. The 'Green Wedges' was a combination of forests, agricultural lands, allotments and parks that was **integrated** into the city to break the urban density. The 'Green Wedges' was a tool to build resilience against future food shortage, air raids, and the proliferation of fire, which also has a function of congregation points and escape routes. Although this reconstruction plan has not been implemented, it has raised the importance of the cities resilience and self-sufficiency topic in future urban strategies.

In the 1970s rose a new public concern – climate change. That was a consequence of the rapid urbanisation, with the enormous consumption that demanded expansion of the urban areas, industrial plant, agriculture industry, electrical generating utilities, new transportation infrastructure, land mining, etc. Those human activities pollute, disrupt the ecosystem, and cause climate change. With the raised public environmental concern emerged the need to find alternative solutions for constantly growing polluting, energy and resources depleting cities. To reduce cities' ecological footprint was introduced new typologies of sustainable cities, such as eco-city first introduced by R. Register in 1987, arcology concept by P. Soleri proposed in the 1970s and continuous productive urban landscapes (CPULs) by A. Viljoen and K. Bohn in 2005. In these concepts, agriculture is **intermixing** within city fabrics to lose the boundaries between rural and urban areas. In this approach, urban agriculture becomes a part of the sustainable lifestyle not only infrastructure in the city. Thus, agriculture intermixing with the urban fabric has a quality to reduce ecological footprint by reducing food miles, closing the nutrient loop, and increasing biodiversity. Moreover, it also helps to manage stormwater and reduces urban heat islands.

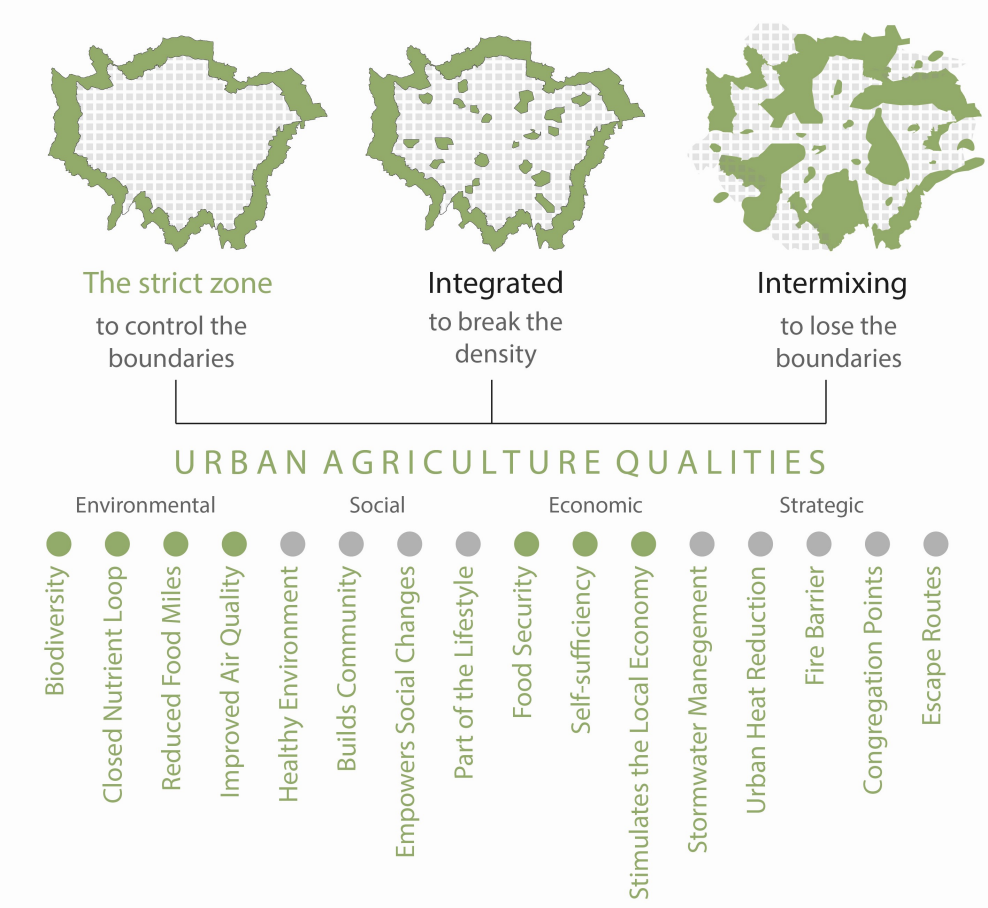
Lastly, extracting the research findings from these three specific moments in London's history can be defined three main strategies of urban agriculture in urban planning:

1. The strict zone line to control the boundaries of the urban areas.
2. Integrated into the urban areas to break the density of the built-up zones.

3. Intermixing with the urban fabrics to lose the boundary between rural and urban areas.

The benefits that urban agriculture brings to the city can be categorized as follows:

1. Environmental qualities: increased biodiversity, closed nutrient loop, reduced food miles, improved air quality.
2. Social qualities: a healthy environment, brings people together, empowers social changes, part of the lifestyle.
3. Economic qualities: food security, self-sufficiency, stimulates the local economy.
4. Strategic qualities: stormwater and urban heat management, fire barrier, congregation points, escape routes.



Map 4. Mapping urban agriculture parameters

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+information of Map 1 Food cultivation in London in 1900-1914 and Map 2 Food cultivation in London in 1914-1945

Map 4

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