COMPARING URBAN FOOD SYSTEMS BETWEEN TEMPERATE REGIONS AND TROPICAL REGIONS- INTRODUCING URBAN AGROFORESTRY IN TEMPERATE CLIMATES THROUGH THE CASE OF BUDAPEST

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ABSTRACT

The aim of this paper is firstly to assess what makes urban agriculture more successfully integrated in some cities than others. Secondly, to introduce agro-ecology practices in public green open spaces and community gardens through a landscape assessment and a map-based comparison analysis. The main problem is to motivate the planners to integrate urban agriculture in the Urban plan. Therefore, these green structures with their benefits cannot be part of the city's landscape and dynamic. The sustainability of food systems depends on the planning strategy of the city and the governance policies. Whilst urban agroforestry is well applied in Tropical Climate, it has not been fully explored in Temperate climate. This practice could have multiple functions in the Temperate Region and become a sustainable land use thanks to agro-ecology principles. After defining urban agroforestry for Temperate Regions, a methodology to find the best spaces to introduce agro-ecology practices will be evaluated through the case of Budapest where a green infrastructure plan has recently been launched and an agroforestry project is being initiated. This paper concludes that urban agroforestry is a sustainable land use that can better integrate food systems in the city.

Keywords: agro-ecology, food security, landscape architecture, sustainable food system.

1 INTRODUCTION

As urban agriculture is expanding around the world (FAO [1]), it occurs that implementing this practice in landscape architecture and town planning is necessary. Cities are rapidly growing and are expected to spread more intensively in the future (EEA [2]). This threatens the green spaces, agricultural lands, natural habitats and ecosystems. Loss in biodiversity is caused by fragmentation of natural habitats and anthropic activities such as intensive farming and monoculture. Planners have denied their role in planning food systems and providing food in cities, creating an imbalance in food provisioning and in the landscape, 'Urban planners might justify this 'puzzling omission' by claiming that the food system is largely a rural issue and therefore beyond the scope of the urban planning agenda.' (Morgan [3]). With upcoming climate change scenarios human beings are more vulnerable, socially, economically and environmentally. It is time governments and planners consider urban agriculture as a solution for building resilient cities and landscapes. Uban agriculture can be defined as an intentional and deliberate practice for reconstruction of ecosystems with strong social participation for enhancing food security in cities. Based on a scientific research and a literature review, different terms could be found to define food systems: *edible landscapes*, *consumption patterns, edible green infrastructure, continuous productive urban landscapes, new urban agriculture.* Urban agriculture can be classified into a typology of structures: *allotment gardens, urban farms, green roofs, green walls, urban orchards, vertical farms.* However, policies around urban agriculture are different across the world. The question is how to integrate these systems in the urban landscape as a full land use. According to Wiskerke, there are three ways to succeed in the planning of food systems: the creation of a food policy

ISSN: 1755-7437 (paper format), ISSN: 1755-7445 (online), http://www.witpress.com/journals
DOI: 10.2495/DNE-V13-N4-395-406

council, a municipal department of food and placing food as the responsibility of the planning department (Wiskerke [4]). Edible landscapes enhance food security in the city, reduce dependence on importations and provide social and economic benefits. The environmental benefits of urban agriculture are still under debate as there is a disparity in the world's access to good quality soils, water and air.

In this study, we define sustainable food systems as a way of growing edibles with agro-ecology principles and on a secured long-term land to enhance food security, for a consumption of high-quality food in equal access. The economic outcomes are also to be considered in sustainable food systems, but this is not covered in the paper. The aim of this research is to assess how agroforestry could be integrated in Temperate Urban Climates and the purposes this practice would have. Agroforestry is defined as 'a collective name for land-use systems and technologies where woody perennials are deliberately used on the same land-management units as agricultural crops and/or animals, in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economical interactions between the different components' (Ramachandra [5]). There must be a significant interaction between the woody and nonwoody components of the system, either ecological and/or economical. The questions are why should we turn to urban agroforestry practice in urban environments and how to plan this food system ? The aim of this paper is firstly to assess what makes urban agriculture more successfully integrated in some cities than others. Secondly, to introduce agro-ecology practices in public green open spaces and community gardens through a landscape assessment and a map based comparison analysis. Case studies, articles and observations were used to understand the policies behind urban agriculture in the northern and southern hemisphere. A literature review highlights the benefits of agroforestry systems and urban agroforestry practices. After defining urban agroforestry for Temperate Regions, the analysis focuses on the case of Budapest where a landscape assessment helps to understand the purposes of agroforestry in the city and ways in planning. This paper concludes that urban agroforestry is a sustainable land use that can better integrate food systems in the city.

2 SUCCESS AND DISPARITIES IN URBAN AGRICULTURE

After the UN Summit of Rio de Janeiro on Sustainable Development, the City of Montreal established a local planning program called *eco-neighbourhoods* in 1995, in the frames of a Local Agenda (Reyburn [6]). This has empowered the districts and citizens to initiate and plan green actions in their neighbourhoods. The two main initiatives driven by the citizens are intensive urban horticulture and green laneways. Since 2002, the eco-neighbourhoods are financed by their districts (REQ [7]). Whilst these were mainly created to raise social awareness on the environment it occurs that the main objectives driven by the citizens have become social. Initially there were four policy measures: 1. education and action program in environment 2. Community based actions 3. Encourage citizens to create environmental actions themselves and get involved. There were also four programs: 1. Clean neighbourhoods 2. Waste management 3. Beauty and aesthetics 4. Nature in the city. Today, there are 16 econeighbourhood programs in Montreal. Urban horticulture was motivated for insuring food security and more social equality between the districts as in 2006, 36% of children lived under the poverty line (Boudreau [8]). The responsibles of the program are employed by the district and are offered a place to gather and run their projects with volunteers. The intensive gardening spread to the housing plots of duplex, triplex and quadruplex separated by laneways and small backgardens, typical of Montreal's urban fabric. Urban gardening is part of the urban fabric and dynamic. The main successes of this program are the creation of jobs,

internships and a strong knowledge exchange through educational programs. Community gardens, schools and even universities organise workshops, activities and international programs to teach horticulture and food systems planning in the cities and their peripheries. From participating in the School of Urban Agriculture Week in Montreal's university UQAM in 2013, it appears that the planning concept of Small is Beautiful is the motor of these initiatives. Urban agriculture in semi-public plots is animated by horticultural and gardening instructors employed by the district. These are responsible for the management of the plots and volunteers. This helps in building collective activities and fare sharing of harvests. In 2013, it was reported that 42% of the inhabitants in Montreal practiced urban agriculture, which means 800 000 people. It is also important to mention that this gardening is not just expanding in poor quarters but also in up-market neighbourhoods in the core of the City through a green network between the laneways. These green laneways and gardens have become urban green trails, which can be followed on maps. In time, the metropolitan map of the green and blue network shows that there will be a connection between the locally planned green network and the metropolitan plan. Also, greening the laneways was a way to revive these paths and change the bad reputation and image they had (Beaudet [9]). Along these can be found gardens, art and recreational activities. Green Laneways help in reducing departures to the suburbs as they provide the same benefits: a green space in front of homes with safety for children to play in (Guelper [10]). It is not just a plan for green spaces in the city but also a social program. Thanks to a public consultation about the importance of urban agriculture in Montreal in 2012, this practice is part of the Urban Plan, the Sustainable Development Plan and carried out through other major programs of the City. The fact that these programs were carried out by motivated citizens and organised with animators are important elements for the success of public and semi-public edible gardens.

In Nice, South of France, a community garden was founded by an NGO 'Graines de Fermiers'. From experience and observations, it seemed that the lack of animator lead to long debates between volunteers and a more individualist vision with low sharing and communication. There was a problem with the organisation in management of green wastes, watering and even share of the plots. The garden is isolated from the rest of the city and is difficult to access to or even notice. Community gardeners in France are often created and managed by NGOs who depend on governmental funding to maintain their activities with volunteers.

The case of Havana stresses the importance of education and governmental implication for sustainable food systems. In Havana a Policy for Urban Agriculture has been running since 1997 and a decentralised law for urban agriculture was established (Observatoire Villes Inclusives [11]). The government has built strong educational programs to encourage and teach the urban gardeners to work with active organic methods. The importance of Urban Agriculture in Havana is proven by the creation of a Department of Urban Agriculture. Thanks to a governmental change on land use, and the autoconsumo plan initiated in the 1980s (Gonzalez [12]) there is a high accessibility to lands for gardening. This has lead to a rapid expansion of this practice in the city and self- food provisioning for families and employment on farms and less resource demanding needs and transport.

In Dar Es Salaam, urban agriculture is used as a measure to end settlements growth in flood risk areas (Howorth [13]). This has lead to a better management of the landscape and brought food closer to families and employment.

In Budapest, urban agriculture was very strong during the two World Wars. Until the 1980s, Bulgarian farmers on the Csepel Islands, District (XXI) provided food to the city. They helped in reducing hunger as they sold their organic products from the island and on markets across the city (Körösi [14]). Only a small number of farmers remain today. Since

the integration in the EU, importation has slowly ended this practice on the island. Hus a new housing estate was built in this island destroying around 5 hectares of sandy grassland vegetation (Tenk [15]). The agglomeration is expanding with rapid urban sprawl since late 1980s, causing the loss of agricultural lands and natural habitats. But small investment is made on green spaces and urban agriculture in Budapest. A new project initiated by the Government seeks to develop cultural infrastructures on the City Park Városliget. This despite the fact that Budapest only offers 6 m^2 recreational green space per capita (Green Infrastructure Concept, BFVT Ltd [16]). Some community gardens have been initiated and expanding since 2010. The problem is that community gardeners in Budapest, like other cities, depend on short-term contracts with tertiary sector companies. There are 37 edible gardens in Budapest (Faczanyi [17]). These are school gardens, allotment gardens or community gardens. They are founded either by civil initiative or by the contemporary architecture center (KEK) and the NGO VKE. The first garden was created in 2010 on a 400 m^2 land but closed in 2013. An interview with the manager of Grundkert revealed that they had to move from their land 3 times in the last 5 years due to ending of contract with partners. Under these circumstances it is impossible to grow sustainable food in the city and to revive ecosystems in the landscape because there is not enough time. The community gardens are fragmented from the other functions in the city. Short-term contracts with companies cannot provide good conditions for urban agriculture. Between 2010 and 2017, six community gardens were closed.

What makes urban agriculture more successfully implemented in some cities than others is firstly the involvement of the government and the educational support behind this practice and secondly, the sustainability of the ecosystem in the plot. Scenarios for climate change show a need to build resilient agricultural systems, both in cities and rural areas. Agroforestry is a traditional agricultural practice, which has been forgotten in the Temperate Regions due to modern technologies and industrialisation. However, the practice has strongly remained in Tropical and Subtropical Climates. Today it is being revisited by agronomists showing that the value of biodiversity in agriculture has an impact on food productivity and economy. Whilst urban agroforestry is well applied in Tropical Climate, it has not been fully explored in Temperate Climate. This practice could have multiple functions in the Temperate Region and become a sustainable land use thanks to agro-ecology principles.

3 URBAN AGROFORESTRY

Different agroforestry systems exist: industrial plantations, community woodlots, farm woodlots, trees in crop land, alley farming, linear planting, shelterbelts, sequential cropping, wood pasture, protection forestry, land rehabilitation, reclamation (Burky [18]). The important characteristic in all these systems is the use of *multipurpose trees and shrubs,* meaning a choice in planting for several purposes, products, benefits and services. Experiments have been collected about the benefits of trees on crop yields. Chinese farmers plant Paulownia species as their shape provides enough light and shade for undergrowing tea plants (Chinese Academy of Forestry [19]). Plants can bring mutual benefits to each other. The research of these agronomic interactions between plants and animals is called agro-ecology (Gliessman [20]). More diversity means more ecosystem services, which means more sustainable landscapes. Trees bring many benefits to the plot. They lower temperatures on the plot, reducing need in water. They provide organic matter, reducing need in fertilizers. They attract pollinators and provide shelter to fauna. Old trees are an important element for biodiversity as they attract birds and other animals and insects, which are useful to repel parasites and balance the

ecosystem. The most valuable service provided by trees is the protection and revitalisation of soils. The roots help in stabilizing the soil and in smoothing the soil. The wood and leaves help in enriching the soil and creating biologic activity (Bourguignon [21]). Some trees have been more beneficial than others, for instance Poplars, which are intensively used in the south of France amongst vineyards (AFAF [22]). The ecosystem of the soil is a most valuable resource. Its organisms regulate the circulation of air and water, the temperature and the access to nutrients. Must be mixed families, species and stratas of plants to gain multiple benefits from soils and reduce vulnerability to climate change and disease. The national research in science INRS and the French organisation for agroforestry AFAF finance many farmers to experiment agroforestry. A wider project is carried out through a cooperative between municipalities: the Biovallée, 'Organic Valley'. It has grown a multifunctional agro and socio-ecological landscape with new employment, educational programs and markets. But despite the growing use of agroforestry in rural landscapes, this practice is still underdeveloped in urban landscapes.

Through case studies, it was found that the main varieties of edibles were domestic crops such as: radish, carrots, tomatoes, beans, cucumbers, lettuce and peppers. Rarely shrubs, trees, berries or even perennials. Some initiatives show an interest in valuing fruit trees but these are carried out separately. For example the world map 'Falling Fruit' is a US cooperation inviting volunteers to map the public fruit trees in their cities. In Montreal, there is also a city map on which garden owners invite people to help harvest their fruit trees to avoid waste. But they have a separate program for planting public trees with citizens. In the south of France more research is conducted for diversifying species in renewed woodlands or reforestation programs in the frames of agroforestry by mixing wide canopy trees with fruit trees, 'Boisement mélangé' (Becquey [23]). By reviewing green strategy plans and food plans in northern countries, it appears that there is often a separation between urban forests, urban farms and urban agriculture. And a choice between growing fruit trees, ornamental trees and annual crops. In Budapest, the green infrastructure plan doesn't mention any green space for food provisioning and community gardens. A wider place could be given to trees in edible gardens and more connections could be made between food systems, green spaces and other functions in the city. In Havana, the Policy for Urban Agriculture includes growing of trees (Observatoire Villes Inclusives [11]). They have a forestry program, *Mi Programma Verde.* But reports stated that there was a lack of diversity in seeds and species (Gonzalez [12]). Therefore, there is a need in designing food systems with more diversity of species and stratas.

A more extensive agroforestry system is growing interest in gardeners: *Forest-gardens.* Traditional forest-gardens have been growing in home gardens since ancestral times in Tropical and Subtropical countries. They all have different names and are attached to different values and religions, for example in Java, Nepal and Sri Lanka. Urban agroforestry is a well- established practice in the Pacific Islands. Intensive agroforestry systems are grown on idle lands in these by families to self-provide food for their homes. These are expanding in cities in response to increased urban density and low proximity with rural areas (UNU [24]). On these lands people grow a high diversity of edibles, medicinal plants, wood and biomass. For example Palm trees are inter-cropped with coffee plants. The Kingdom of Tonga has registered this practice in the strategic plan for resilience and adaptation to climate change (UNDP [25]). The plan includes a section for agro-ecology practice for sustainable agriculture and food security: 1. Promote conservative cultivation such as minimum tillage, green tillage, vegetative mulching, etc. 2. Promote the use of bush fallow, planted legume fallow, etc. 3. Promote conservative input of the correct mineral fertilizer at

the right amount in combination with appropriate organic fertilizer 4. Promote conservation cultivations of contour boundary hedgerows, terracing, mulching, green tillages, planted fallow, etc. 5. Promote alternative local species/ varieties or breeds 6. Promote introduction of exotic varieties or breeds suitable for the more humid warmer climates 7. Promote integrated pest management strategies with resistant varieties, biological (UNDP [25]). Other worldwide projects are carried out with forest gardening practices. For example, *Greening the Desert* is an experiment for growing food and providing water in arid regions. This shows that agroforestry is not only a sustainable way to grow food but also a way to preserve landscapes and reduce environmental and social vulnerability. It also increases the production on a small space.

Forest gardens were introduced in Temperate Climates by Robert Hart in 1960 who modelized the concept in England. Today the leading reference is Martin Crawford who has 500 varieties of perennial edibles in 1 ha woodland in England [26]. He uses 7 to 9 plant stratas, which all have a purpose in the garden. Ground covers are plants, which expand horizontally and help in maintaining humidity in the soil, as well as smoothing the soil so other plants can expand their roots to access to water and nutrients. They can also attract pollinators. Mushrooms help in creating an active organic soil. Vines or climbing plants can be grown on trees. Herbs help in attracting pollinators, can help in fertilizing the soil and repelling parasites. Shrubs attract birds that can also help in repelling parasites. Fruit trees can be supports for climbing plants. Wide canopy trees create shelter for pollinators and regulate the temperature. Some people even create ponds and have aquatic plants in their gardens to create a fresh micro-climate. This model implies a full design strategy and preparation of land for companion planting and to create a self-sufficient ecosystem. Not only should be mixed plant stratas but also plant families and species.

This practice is growing across European homegardens and private woodlands but rarely in public spaces. Swedish researchers Clark and Nicholas introduced the concept of ‘Urban Food Forest’ (UFF) in 2013 [27]. This practice is mainly based in homegardens, community orchards and perennial urban agriculture. In the United States can also be found Woody Perennial Polyculture (Center of Agroforestry [27]). An agroforestry community garden was experienced with Subarctic First Nations in Ontario (Spiegelaar [28]). But still the potential of this practice has not fully been studied. For the Temperate Climates agroforestry can be defined as the introduction of multipurpose trees and other woody perennials in the urban landscape for environmental, economic and social benefits. The purposes learnt from agroforestry could have an impact on the urban environment and the landscape, like reducing heat stress and providing more diverse yields.

4 INTEGRATING AGROFORESTRY IN THE URBAN LANDSCAPE, THE CASE OF BUDAPEST

An interest in agroforestry is growing in Hungary. Experimental plots were funded by the European program AGFORWARD in the south of Hungary, in Fajsz, and managed by a cooperative [29]. There is also a research department on agroforestry in the University of West Hungary in Sopron. A few families and NGOs are growing forest-gardens in towns and settlements outside of Budapest. For instance, a forest- garden is managed by an NGO and students on the campus of the University of Gödöllő. In October 2017, for the benefit of this research, a conference and workshop were organised in partnership with the Center of Contemporary Architecture of Budapest (KEK) and the NGO Cargonomia to present the concept of urban agroforestry and find potential plots. The event gathered 50 people and a high level

of motivation could be observed. The public consisted of locals, agronomists, architects, biologists, planners and representatives of district municipalities. Despite the political context, it seems like a good time to experiment agroforestry in Budapest.

Budapest is divided into two micro-climates creating two different ecosystems on both sides of the river Danube. The west side is windy and damp. The 500 meters high Buda hills are covered by protected forests of Oaks. The east side, Pest, is the beginning of the Hungarian plains the 'Alföld'. The area is dry and sandy. It used to be covered by wetlands. Few grasslands, wetlands and woodlands remain. When looking at the green intensity map of Budapest (Fig. 1), the dichotomy is clear between Buda and Pest. The West side has a much higher proportion of tree canopy and lesser density of residents than the East side. The Pest side is more developed and mineralized by grey infrastructure.

The heat map (Fig. 2) shows a direct relation between the green spaces and the temperature of the soils. Budapest has a high proportion of sealed soils of 160 m^2/capita (EEA [30]). There is low access to water for no access to the Danube. Collective housing plots have typical private inner courtyards, which are shared between neighbors. Their mineralized surface also increases heat stress in the summer. According to the analyses of the Green Infrastructure Concept of Budapest (BFVT Ltd. [16]), only 6 m^2 per capita of green open space is offered in the city, which is much lower than the World Health Organization requirement of 9 m^2 per city dweller. This shows a need in providing recreational green space in the city, especially in the East. Vegetation must be adapted to very harsh conditions, drought and coarse winters. Should also be considered that 50% of the country's homeless live in Budapest, meaning 7500 (Homeless statistics [31]). Therefore, increasing access to public food spaces seems necessary.

In Budapest, the city trees are planted and managed by Fökert a non- profit organisation. The public green spaces are managed by the districts. Since 2017, a program is funded by the government to plant 10 000 trees in Budapest. These are mainly planted in rows on central reservations of the roads and do not serve any social or environmental purposes. The problem

Figure 1: Green intensity map of Budapest.
Source: Sándor Jombach, in Green Infrastructure Concept of Budapest, BFVT Ltd., 2017.

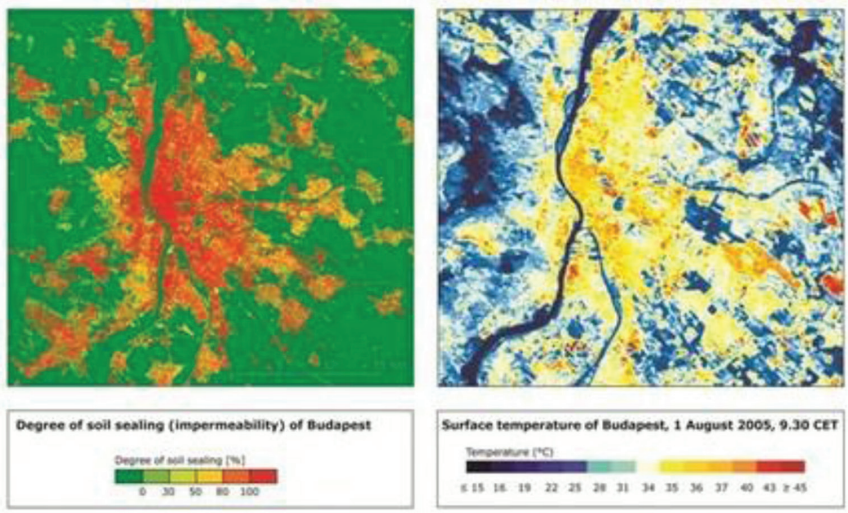

Figure 2: Map on surface temperature, Budapest.
Source: EEA, Richard Ongjerth, Péter Gábor, Sándor Jombach, 2007 and Péter Gábor, Sándor Jombach, Richard Ongjerth, 2008.

is that most young trees do not survive more than 10 years and often need to be replaced (Szaller [32]). This is due to the poor conditions of the soils, to the inaccessibility to water and nutrients and a bad preparation of the soil for the roots to develop. The main trees planted are *Acer platanoides*, *Acer negundo*, *Aesculus hippocastanum*, *Acer saccharinum*, *Acer campestre* (native), *Fraxinus excelsior*, *Ailanthus glandulosa*, *Celtis Ulmus* effuse Populus and genus of native *Sorbus* and *Tilia* (Szaller [32]). Some trees could have multipurpose in the city and be more suitable for the environmental conditions. For instance, *Sorbus* spp. has a high tolerance to urban pollution and has resilient seeds, which can grow in poor soils even after 5 years (Bouton [33]). The fruit from *Sorbus aucuparia* attract birds. Seeds spread out widely and these trees do not require much maintenance. They are also popular in home gardens for their easy level of maintenance and aesthetic value. In a wider urban planning strategy, agroforestry could be integrated in the city's landscape. Through aerial images, land use maps, geological maps, social maps, the analysis of green cover and housing plots, landscape architects can assess the best places for growing food in the city and enhancing connections between consumption patterns and other functions in the city. A map of contaminated land should be done to find safe places for growing food and assess where soils could or should be restored for this purpose. Historical maps can be used to review landscapes and ecosystems to renew in the city. The inner residential courtyards provide a space for testing agroforestry on a long-term bases because the management would be directly organised by the owners. Multipurpose trees and woody perennials could also be tested in allotment gardens.

Community gardens could be used to try agroforestry practice for environmental, social and economic outputs. By assessing these gardens with high resolution aerial images in Google Earth we could see whether trees were planted on the plot or not and if there were any other edibles than annual crop. For example, Leonardo Kert was a 1400 m^2 community garden held by the KEK. Despite the width of the area, no trees were planted. Due to an ending contract this was closed in 2017. Árnyas kert is a 1213 m^2 community garden with 29

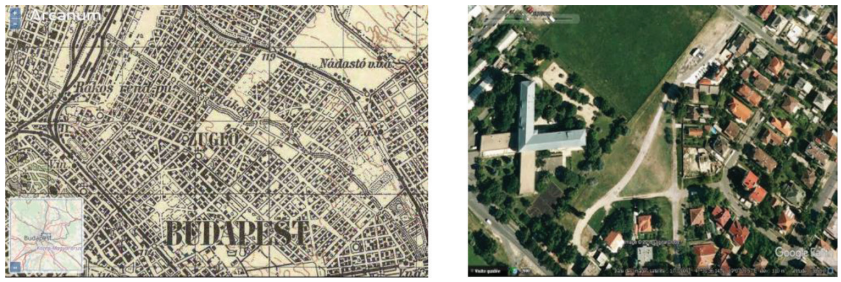

Figure 3: The evolution of a wetland along the Rakos Creek; between 1941 and 2016. *Sources*: Military Survey of 1941, Mapire.eu; Landsat 8 image, Google Earth.

gardeners. Trees were already planted on site but these are not valued and used. These gardens could be expanded and connected to wider green connections in the city. For example, public open green spaces between high residential buildings offer small-scale green connections, which could be explored for planting continuous edible landscapes.

On a larger scale, the Rakos creek is a 44-km corridor. which connects the city of Gödöllő to the Danube River in Budapest. This used to be an agricultural area and crabs used to be sold on markets directly from the stream. But due to pollution and expansion of the city the fauna was lost. The creek crosses many semi-natural spaces and dense residential neighbourhoods. It also connects different green spaces such as abandoned woodlands, agricultural lands and grasslands. Some underused sandy lands were also found (Fig. 3). An interest in reviving this landscape seems to be growing. The Green Infrastructure Concept intends to value the creek and enhance its potential as a recreational green space. An NGO 'Zöld XVII' is improving the landscape of the creek in the 17th district by planting trees with the community and raising environmental awareness campaigns. People use this area for jogging, walking their dogs and cycling. By analysing the heat map and green intensity map, it is obvious that the creek offers a great potential for recreation and reducing heat stress. It also reveals the intensity of grey infrastructure and the direct negative effect on the creek's benefits in the dense inner city.

This offers a potential green corridor where agroforestry systems could be connected to other recreational green spaces and ecosystem services. Agroforestry could be tested for its impact on renewing the landscape, the quality of the water and the comfort for people. The districts of Budapest generally offer rich mosaics. They are subdivided into diverse green patterns mixing parks, woodlands, agriculture, semi-natural areas and open green spaces between buildings. These all offer resources for combining green spaces with food systems with a close connection to people.

5 DISCUSSION

From presenting urban agriculture in universities, it seems that planners view this practice as a step backwards and a loss of potential land to develop. Thus, the lack of integration of urban agriculture in landscape design and town planning leads to fragmentation between consumption patterns, public green spaces and other urban functions. Urban gardeners often struggle to find long-term spaces to grow food. This leads to a low choice in land and sometimes poor conditions for growing sustainable food. In order to convince planners to take into account food system planning in the cities, the research of multifunctionality of food systems is necessary. The loss in biodiversity together with remaining social inequalities between cities and

even between their inner districts, for access to green space, recreation or food security, shows there is a need to plan with ecosystems and create eco-social programs in the city and with peri-urban farms. As our resources in healthy food, healthy soils and healthy air have decreased and the need to adapt to climate change is a long-term matter, it is necessary to restore natural resources in cities. There is also inequality in access to fertile and uncontaminated soils, water resources and land for growing sustainable food systems. The policy behind urban agriculture has an impact on its integration in the urban landscape. In some cities, people can live from urban agriculture. In other countries like France, it is impossible because the NGOs always search for funding to support their activities and cannot create any jobs. In Budapest, community gardens are vulnerable in their partnerships with companies. To avoid fragmentation, the case of Montreal showed that smooth tools empowering the citizens to take initiatives had a positive impact on local green networks and the landscape. It has influenced people's behaviour and appropriation to space. The governmental support is essential to open lands for growing sustainable food and monitoring the conditions. With an agroecological approach better conditions could be created to grow trees and food in the city. It is important to connect urban food systems with other green spaces to increase biodiversity in the city, mix vegetation species and green patterns. Through cooperation between NGOs, green space managers and planners, food systems could be integrated to green infrastructures. The main challenge in food systems is to find good soils and to adapt to the urban context by choosing resilient edibles. More research should be done to understand the functions of species in the ecosystems to create more resistant, sustainable and diverse green structures and green spaces. It is not only about growing food but growing the right food in our cities. Educational programs are essential to gain all benefits from urban agriculture and expand the practice in a sustainable way.

6 CONCLUSION

To grow sustainable food there is a need in long-term plots with high biodiversity to create a rich ecosystem as this provides a safer environment for growing food. Soils are an important resource, not only for growing food but also for sequestering carbon. By combining trees with food systems, more benefits could be provided for the whole city with social, economic and environmental outcomes. With a landscape architecture approach, it is easier to find the best places for growing edibles in the city and enhance equal access to food and open green spaces. Many different systems exist in agroforestry but in a dense city context the most suitable system could be forest gardening as it requires less space. The forest-garden in Gödöllő could be connected to this Rakos creek green corridor through community agroforestry woodlands and agroforestry gardens. A strong cooperation should be planned between gardeners and farmers along this corridor to create a full agro-ecology program and avoid a domino effect from contamination of lands with chemicals and pesticides. The limiting factor is that urban agroforestry is a long-term process. Annuals grow faster, and therefore, it is possible to feed people quickly on a daily bases. But with more diversity in food systems across the city, it is possible to overcome this problem and adapt to the rhythm of trees.

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