Urban Farming within the Environmental Planning of Thessaloniki, under Economic Recession

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Abstract - The actual economic crisis period in Greece, which is particularly noticeable in the urban areas, has led many people to seek cheap ways to meet their basic biological needs. Consequently, the cultivation and production of fruits and vegetables within the city or within close distance from it, has, over the latest years, attracted the intense interest of the residents of the urban areas, either through personal initiative or with the collaboration of citizens and cooperative. This paper examines the potentiality of the urban agriculture and the number of people who may be fed from the application of urban agriculture in the densely populated Urban Area of Thessaloniki (UATH), in an effort to find a way to deal with the growing urban poverty and food insecurity, particularly regarding the vulnerable groups of citizens affected by the economic crisis. As a result, the applicability of urban agriculture in a central, densely populated area of Thessaloniki is investigated and a design proposal is presented.

Keywords: urban agriculture; economic crisis; environmental regeneration; green design; open spaces

I. INTRODUCTION

The recent global financial situation, which has been one of the most serious economic crises in the last two centuries, has not left the Greek economy unaffected. Over the last years Greece has been going through the most critical moments of contemporary history, as the political decisions and the mismanagement in the finance sector have brought the country on the verge of bankruptcy several times.

Apart from the intense environmental problems that have been created (Kaparakis, 2009; Nikolaou, 2011), world economic downturn, combined with the sharp world's population growth and the intense urbanization, have increased poor residents' rates, especially in contemporary cities (Cohen, Garrett, 2009; UN-Habitat, 2003; Hillebrand, 2009). The increasing poverty and high food prices have generated problems in the equitable and fair access to food products, developing food insecurity (Godfray et al. 2010). Over one hundred million people on earth cannot have sufficient caloric intake (Clapp, 2009) and are unable to meet their basic diet needs because of their low income.

In Greece the salary and pension reductions, the constantly rising unemployment rates, the income uncertainty, the continuously declining number of healthy companies and the significant cutbacks in social benefits have created such conditions that have led to household bankruptcy (Aggelopoulos, 2009; ELSTAT, 2014; Thessaloniki Chamber of Small and Medium Industries, 2012; Thessaloniki Chamber of Small and Medium Industries, 2013). A high percentage of the population has become unable to provide themselves with the basic goods (Matsagganis et al., 2012). According to the Public Policy Analysis Group of the University of Economics in Athens, the poverty rate of those considered poor before the outbreak of the crisis (with criterion of indexed adjusted poverty level in 2009) has significantly increased (35.4%). Therefore, according to a research released by EUROSTAT on the number of European residents living in poverty and social exclusion for the year 2012 (Eurostat, 2015[1]; Eurostat, 2015[2]; Eurostat, 2015[3]), it was found out that in Greece 23.1% of the population live in poverty (having an income below 60% of median national income), 19.5% of the population devoid of basic consumer goods, or fails to respond to basic financial liabilities, while 12.9% of the population live in jobless families (families with no member has "a regular job").

The recent economic crisis, which mainly affected the urban centers, has motivated the interest of residents, mostly unemployed and poor people, and also public institutions (municipalities, civil partnerships, etc.) to create urban and peri-urban vegetable gardens (Klontza, 2014; PER.KA, 2015; Elafros, 2013) .

Along the quantitative research deals with the hypothesis: if the application of the urban cultivation of horticulture is able to contribute to the confrontation of economic recession. So the available free urban spaces of the UATH, appropriate for urban cultivation are estimated, as so as the percentage of the population which can cover its needs for vegetables from the setting up of kitchen gardens within the urban landscape.

The purpose of the paper is to realize the importance of redesigning free urban open spaces, through the application of urban agriculture, which in addition to the city greening and environmental regeneration, it is a means to confront the growing urban poverty and food insecurity in urban areas. It was investigated the possibility of applying Urban Agriculture in a densely constructed area of the city of Thessaloniki, with easy access to its citizens, in addition to suggesting the detailed planning and the environmental regeneration of the area.

II. METHODLOGY

First, the identification and calculation of urban open spaces, which are suitable for urban agriculture within the urban environment of UATH has been realized with the help of the research project "Strategic and Operational Plan for the Green in Thessaloniki" (Papamichos et al., 2006). Then it was investigated if the open spaces were able to offer a sustainable solution in food production, by calculating the number of households that could be served by this action. For the preparation of this research, emphasis was placed on the existing green areas, the special use areas and the unstructured spaces, which are located within the urban area, as they respond better to the real situation of residence environment and the surfaces of the available green spaces.

To investigate the potential of the urban agriculture application within the dense urban landscape of Greek cities, an open green space in the city of Thessaloniki was chosen. The selection criteria of the open green space have been analyzed and the benefits and impacts of the proposed action have been explored. For the implementation of the design of the urban agriculture a big block was selected in south of the Thessaloniki city and where the ex-industrial complex "Mills Allatini" was built.

III.SELECTED RESULTS

A. Calculation of the number of people that will be served by urban agriculture

From the data and information that was collected from the research project "Strategic and Operational Plan for the Green in Thessaloniki" (Papamichos et al., 2006), the existing green areas per every municipality separately of UATH were calculated (see Table 1 below, Figure 1).

TABLE 1.
EXISTING GREEN SPACES WITHIN THE UATH
(own processing, source of data: Papamichos et al., 2006)

Municipality	Public green areas (ha)	Green areas of utility facilities (ha)	Unstructured and green spaces for special uses (ha)	Green Slope of transport routes (ha)	Streams and wetlands (ha)	Total area (ha)
of Thessaloniki	97.61	170.8	64.73	0.17	1.96	335.2
of Kalamaria	76.01	91.84	16.29	0.88	–	185.0
of Kordelio-Evosmos	30.30	42.08	4.11	0.96	2.29	79.74
of Neapoli-Sikies	25.72	31.76	0.28	0.46	4.15	62.37
of Pavlos Mela	64.17	78.49	6.35	1.98	4.99	155.9
of Ampelokipi-Menemeni	44.56	23.78	9.25	3.74	–	81.33
of Pilea-Chortiati	14.09	10.07	0.22	0.14	12.23	36.75
Total area (acres)	**352.4**	**448.8**	**101.2**	**8.33**	**25.62**	**936.4**

According to the last census of the Hellenic Statistical Authority (ELSTAT) of the year 2011 (ELSTAT, 2013), the total actual population in the study area is about **824,467 inhabitants**.

The study examines the criteria by which the appropriate location can be selected, for the application of urban agriculture and the development of vegetable products (Savio, Borel, 2011; Nonnecke, 1989; Swiader et al., 1992; Dencla, 2002). The selection criteria of suitable open spaces for urban agriculture are:

i. environmental and ecological criteria: a) The exposure of the area in the sun, at least six hours a day under the sun, b) Gentle terrain, c) Healthy soil, d) Chemical composition of the soil, e) Not covered by multi-annual crop (olive trees, pistachio trees), f) Availability of irrigation water, g) reduced atmospheric pollution from road axes that surround it,
ii. Spatial planning—urban criteria: a) Convenience access to the site, b) Existence of parking spaces, c) Availability of a single open space, d) No pressures because of competitive uses, e) Open space size,
iii. Proprietary criteria: a) public, b) private.

To be able to calculate the production yield of cultivated land, in order to count the vegetable products that may be produced, we based our study on the official data of the Hellenic Statistical Authority (ELSTAT). First, (see Table 2) the production quantities of vegetables grown in Greece for the years 2007, 2008, 2009, were recorded and the alteration for each vegetable was calculated (ELSTAT, 2014). It is worth noting that there is a significant increase in production quantities of vegetable products for the period 2008-2009, which coincides with the beginning of the financial crisis.

TABLE 2.
VEGETABLE PRODUCTION FOR THE YEARS 2007–2009 IN GREECE (own processing, source of data: ELSTAT, 2014).

	Vegetable production in thousand tons			Alteration %	
year	**2007**	**2008**	**2009**	**2007/2008**	**2008/2009**
tomatoes	1.461	1.379	1.561	–5.6	13.2
eggplants	69	60	82	–12.9	35
okras	14	16	14	14.8	–11.1
dry onions	167	193	192	15.8	–0.8
Cabbages and	254	245	243	–3.5	–0.8
leeks	44	40	42	–7.9	4.4
Total number	**2.009**	**1.933**	**2.134**	**–3.8**	**9.4**

Afterwards, the cultivated vegetable land in Greece and the alteration were recorded. The data of the Hellenic Statistical Authority (ELSTAT) for the years 2007, 2008, 2009 (ELSTAT, 2010) are shown in Table 3.

TABLE 3.
CULTIVATED LAND FOR THE YEARS 2007–2009 IN GREECE
(own processing, source: ELSTAT, 2010).

Land cultivated by	Cultivated land in thousands ha			Alteration %	
	2007	**2008**	**2009**	**2007/2008**	**2008/2009**
Tomatoes	33.0	30.9	32.3	–6.4	4.5
other	76.4	77.2	76.9	1	–0.4
Total land	**109.4**	**108.1**	**109.1**	**–1.2**	**0.9**

The processing of the data above, shows that vegetables production performance has ratio: 0.186, 0.178, 0.195 t/ha per year for systematic vegetables

agriculture during the years 2007, 2008 and 2009 respectively, with an **average ratio of 1.86** for these years.

The vegetable gardens in urban areas are mainly based on organic production of vegetables and fruit, so the returns are sufficiently smaller than the conventional cultivations. According to a study (Seufert et al., 2012), the average of this difference of an urban organic farming is located between 13% (best practice) to 25% (average), so the yield translates to 0.140 to 0.162 tons/ha per year.

From the UATH green surfaces that are counted in Table 1 and the criteria of suitable open spaces for urban agriculture in section B, the open green surfaces that have the prerequisites to develop vegetable gardens come from public parks and green spaces of utility facilities (801.3 ha). Supposing that 30% of these plots are related with facilities or areas that are small in size, then the remaining 70% or **560.9 ha** may be available for urban farming. Consequently, it is possible to produce approximately **7852.60–9086.58 tons** of vegetables in urban areas UATH.

The recommendations of the European Food Information Council (EUFIC) for the fruit and vegetable consumption indicate the amount of ≥ 400 gr per day. (EUFIC, 2012). Taking into account that the minimum recommended daily amount of vegetables are 200 gr of minimum daily consumption and since 7852.60 to 9086.58 tons of vegetables can be produced by applying urban farming in urban areas of UATH, we come to the conclusion that about **107,568–124,473 people** can cover their needs in vegetables per year by vegetable farming in the urban landscape. This number represents around 13%–15% of the population of UATHs, rate approaching the percentage of population in poverty (23%).

B. A design proposal

A plot of urban space of UATH is selected for a design proposal for urban agriculture installation and that placed to the ex-industrial complex "Mills Allatini" that was constructed in 1854 in a seaside area, in the district of "Exochon". The selection was made by the criteria of suitable open spaces for urban agriculture in section B, in which the plot has gentle terrain, not covered by multi-annual crop (olive trees, pistachio trees), the exposure of the area in the sun is more than six hours a day under the sun, there is availability of irrigation water in the area, there is convenience access to the site, there are parking spaces around the area, there is availability of a single open space with desirable and acceptable size.

Today the plot of industrial complex has a total area of 26,010 m², where 12,500 m² are structured and **13,510 m²** (52%) constitute an open space. It is located in southern site of the city, between the municipalities of Thessaloniki and Kalamaria, in a wide region with high buildings, but with satisfactory street widths, that allow the necessary ventilation and insolation. The position of the plot in this part of the city favors the inclusion of a network of green spaces, including the city parks at the seaside and open green spaces of the surrounding area (such as church yard space, schoolyards etc.).

The basic idea of the composition is to combine the different functions of two different green areas, the heterogeneous agricultural activities with those of urban recreation parks, both functionally and aesthetically. As it is illustrated in Figure 1, the location of the vegetable gardens is chosen to be in the South-South East part of the plot as the most suitable place to implement urban agriculture. The basic criterion for the site selection was the sufficient sunlight for the vegetables to grow. In addition, it is a fairly protected area from adverse prevailing North-North West winds and also the hot Southern winds during the summer.

The proposal, except of the vegetable gardens, includes an educational information center, for exhibitions, seminars, etc., to inform and educate citizens and students on environmental issues, children's vegetable gardens in South East corner of the plot, to educate students and visitors on vegetables and herb farming, vertical gardens and aquaponics in specially selected locations, in order to inform the public on other gardening methods and their capabilities, a composting area and gardens for herbs or flowers. To increase the green surfaces, it is suggested to locate green roof on terraces of buildings. Meeting places and relaxation areas are scattered placed in various points. Internal meeting places are shaped inside the buildings, to be used by the farmers, as well as a kitchen, tools and seeds storage depots, toilets.

The rest of the outdoor space of plot is configured mainly in one level. The integration of the levels (where it is required) is made with shallow ramp, so people with disabilities and reduced mobility can cross the place without barriers.

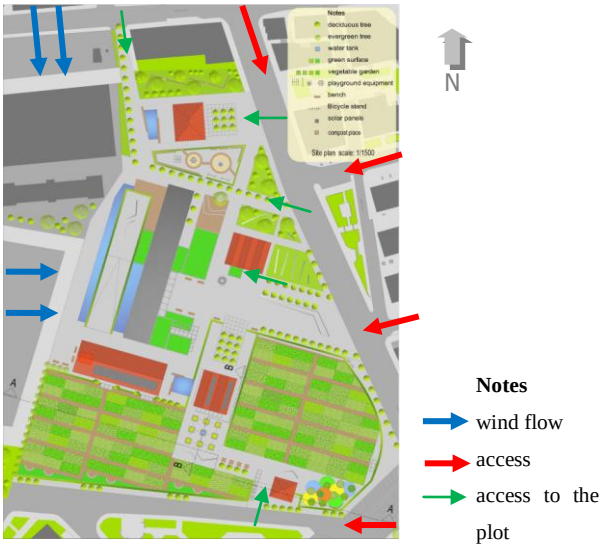

Figure 1. Basic concept composition.

Around the vegetable garden a double fence and the planting of evergreen trees, lined outside the fence is placed for protection from vandalism and acts as a natural boundary, while gives the space high aesthetic and better air quality, by reducing the intensity of the wind. The selection of the vegetation is based on the

pollution resilience of species and their resistance to the particular climatic elements of the environment. The aim is to highlight the seasonality through the variety and the alternation of flowering period colors and trees' foliage.

The surroundings and equipments design uses environment friendly materials and technologies with low reflectivity and thermal absorption, high water permeability and low energy. The rest landscape equipment must include: info-stops, specially designed locations for parking of bicycles, waste bins, sitting furniture for open spaces for the users' rest, metal tree grates, awnings and pergolas for sitting areas, wooden toys in the playground.

The reuse of the buildings has been suggested, in order to create a cultural history and industrial heritage center for the city, after the necessary restoration and rehabilitation works. The discreet inclusion with bioclimatic criteria of energy saving systems (as solar roofs) in the shells of buildings is recommended, in order to have self-sufficiency in energy for lighting, heating or cooling.

The basic principle of the study proposals is to provide a stable sustainable input-output system, which aims to the integral self-serve of the vegetable garden, without the need for additional energy or material input.

IV. CONCLUSIONS

Research and quantitative analysis of the data showed that the percentage of the population in the UATH that can satisfy their need for food by creating vegetable gardens is not negligible. About 560.9 ha of land of communal green spaces and green areas of communal facilities may be used for urban agriculture in UATH, from which it is possible to produce about 8000–9000 tons of organic vegetables. It is estimated that up to 124,000 residents, could meet their needs in vegetables. This number approaches the percentage of population in poverty.

The design proposal successfully implements the installation of an organic vegetable garden in a section of the plot of "Mills Allatini" (an open green space of abandoned industrial premises) and integrates it functionally and aesthetically in the design and renovation of the entire street block. The special characteristics of the open space, combined with the specific nature of the operation of a vegetable garden, but also with the morphological and climatic conditions in the area, have led to the basic decisions for the rational positioning of both the vegetable garden and recreational and entertainment areas. Its operation is based on a flow network of energy and circulation of matter. It copies the function and the characteristics of a natural ecosystem. The bioclimatic design interventions with the appropriate selection and location of the equipment and planting create the conditions for the improvement of microclimate conditions in the area.

The inventory of available open spaces for each urban centre constitutes the initial precondition in the direction that has been investigated in this work. The development of urban agriculture in these areas requires collective spirit and cooperation among citizens, and support by both the local government and the state (technical and legislative).

Based on the above, we realize the importance of the redesigning of unexploited public or private free urban open spaces, through the application of urban agriculture in order to cover basic needs for food and accomplish economic recovery for vulnerable by the economic crisis groups. If in the available green surfaces of the above research, we add surfaces that can be cultivated in suburban areas (public and/or private owned land), but also the possibility of using the sites of terraces and the appropriate yards or the uncovered areas of buildings, the food production is possible to cover all the needs in vegetables and fruits of the population that is facing the risk of poverty and food insecurity. Urban farming is not able to resolve the global problem of malnutrition but it can be an essential proposal towards this direction. As the population of cities will continue increasing, access to food for a large part of citizens would be prohibitive and the application and installation of urban agriculture would be necessary for their survival and self-preservation.

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