

TYOLOGY OF URBAN AGRICULTURE ARCHITECTURE

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ABSTRACT

The subject of the paper is contemporary urban farming architecture, defined as urban spaces and objects which are located within cities and dedicated to growing of edible plants. This study aims to investigate design that facilitate urban development integrating the life of the city with the food production. To examine it the following methods were used: literature review, case studies, projects descriptions and analysis based on comparison. The urban agriculture architecture typology and selected examples of each type are presented herein.

Key words: urban farm, urban agriculture, urban garden, landscape architecture

INTRODUCTION

In urban discourse there is a division into what is “urban” and what is “rural”. The terms “urban” and “rural” are often defined relatively – emphasizing the differences in the way people live in cities and villages, as well as in production (industry vs. agriculture) (Sroka, 2014). The result of this dichotomy is a paradigm whereby specific landscape features are attributed only to cities and others only to rural areas. An example is the inclusion of agriculture in the problem of rural development, not urban planning (Lidin, 2016).

The exclusion of agronomy from urban-planning considerations is a result of changes which occurred during the Industrial Revolution. Previously, the city and village had interdependencies – agricultural areas surrounded the urban areas by supplying them with food, as well as limiting their spread. Food production was mainly local. Food was also grown in the cities themselves and animals were reared as part of the daily urban landscape. However, as cities developed, tech-

nological advancements that allowed for the transport of goods to distant locales created a gulf between rural grower and urban consumer. The result of industrial development was also the acceleration of urbanization processes, which also resulted in the increasingly declining green areas in cities (Howe, Bohn & Viljoen, 2005; Steel, 2008).

At present, the issue of agriculture has been re-established in the area of urban development issues. Innovative ideas of sustainable development (Cleveland & Morris, 2015) promote agriculture embedded in urban fabric, among intensive buildings, considered as a structure for agrarian practices (Grochulska-Salak, 2021). Thus, roofs, elevations and streets become biologically active surface, while design objects are sometimes vertical farms whose storeys serves to cultivate plants. It is important that agriculture in cities is often the result of spontaneous, bottom-up actions by urban dwellers. Moreover, the right to land cultivation and self-production of food is increasingly being discussed, as well as food security based on local agriculture (Nordhal, 2009; 2014).

The aim of this work is to explore ways of plant cultivation in urban space, including: systematization and description of the elements of the urban agricultural architecture (UAA). The main objective is to develop a typology of the UAA that can be used for further research. Literature on urban theory, architecture, sociology and food production has been reviewed in the framework of the study. Selected objects of contemporary UAA have been analysed on the basis of: architectural drawings, author's descriptions and critical texts published in various sources. Part of the descriptions and analysis were drawn up on the basis of the critical observation of the facilities during the local vision, which also included photographic inventories. The argument was also based on own design practice, publications on horticulture and websites run by founding groups of community gardens, urban farms, and allotment gardens managements.

DEFINITION OF URBAN AGRICULTURE (UA) AND URBAN AGRICULTURE ARCHITECTURE (UAA)

The main term used in English-language literature is urban agriculture (UA). The Food and Agriculture Organization (FAO) of the United Nations provides the following definition: "Urban and peri-urban agriculture (UPA) can be defined as the growing of plants and the raising of animals within and around cities. Urban and peri-urban agriculture provides food products from different types of crops (grains, root crops, vegetables, mushrooms, fruits), animals [...] as well as non-food products (e.g. aromatic and medicinal herbs, ornamental plants, tree products)" (FAO, 2007, p. 67).

Researchers from the Urban Agricultural Network (TUAN), however, urban agriculture defines: "[...] an industry that produces, processes, and markets food, fuel, and other outputs, largely in response to the daily demand of consumers within a town, city, or metropolis, on many types of privately and publicly held land and water bodies found throughout intra-urban and peri-urban areas" (Smit, Nasr & Ratta, 2001, p. 1). Subsequently, they indicate the ecological and social aspects accompanying agrarian practice in cities: "Typically, urban agriculture applies intensive

production methods, frequently using and reusing natural resources and urban wastes, to yield a diverse array of land-, water-, and air-based fauna and flora, contributing to the food security, health, livelihood, and environment of the individual, household, and community" (Smit et al., 2001, p. 1).

The term given in the title of this work – urban agriculture architecture (UAA) refers to both architecture (buildings), as well as landscape architecture (gardens and greenery in the city). Thus, UAA means objects or urban spaces located within the administrative boundaries of cities and serving the cultivation of edible plants.

URBAN AGRICULTURE ARCHITECTURE (UAA) TYPOLOGY

The preparation of a worldwide typology of UAA, which takes into account all variables on is not possible due to different economic, historical and cultural circumstances. However, the classification of forms of UAA is necessary in order to carry out comparative analysis and planning of urban development. Therefore, researchers in this area, choosing and analysis individual variables, are trying to create a general typology of UAA. The criteria that have been taken into account in developing the various classifications of UA are: location; space morphology and functions; technology; land ownership and type of a producer; object, scale and purpose of production.

The above criteria are intertwined, and due to the complexity of the factors shaping the UA sites and their dynamic nature (e.g. converting the parcel garden into a social garden), it is not possible to create a uniform typology covering all the variables listed. However, different suggestions on the typology of UA organizational and spatial models can be found in the literature, drawn up on the basis of individual variables (Torreggiani, Dall'Ara & Tassinari, 2012; Wowrzeczka, 2014; Grochulska-Salak, Zinowiec-Cieplik & Zielonko-Jung, 2018).

In this work, a typology of UAA was developed, considering the morphological criteria – the form and manner of space arrangement. The form of UAA can be distinguished as surface (horizontal or vertical) or cubature. On the other hand, spatial arrangement

Table 1. Urban agriculture architecture (UAA) typology based on criteria describing the form and spatial arrangement

Type		Form				Space arrangement							
		surface	cubature	area division		recreational area		production technology		production intensity			
				individual plots	by plant type	none	occurs	absent	soil	soilless	low	medium	high
Garden	allotment garden	X		X			X		X		X		
	community garden	X			X	X	X		X		X		
Farm	horizontal farm	X			X			X	X	X			X
	vertical farm	X	X		X			X	X	X			X X

depends on: the division of the area, the presence of recreational area; production technology (soil or soilless crops) and intensity (low – partial use of the area for food production, medium – maximum use of the area for food production, or high – increase of the area by vertical farming) – Table 1.

As a result, the following types of UAA were distinguished:

- 1) allotment garden – i.e. the enclosed area of urban vegetation consisting of garden parcels (rented by their individual users), alleys and communal areas, facilitated with garden infrastructure for agriculture and recreation (Table 2);
- 2) community garden – i.e. garden established on a vacant lot, consisting of land used collectively by a group of people – local community (e.g. neighborhood, school, academic), facilitated with garden infrastructure for agriculture and recreation (Table 3);
- 3) horizontal farm – i.e. the cultivation area of edible crops located in urban environment (e.g. on a vacant lot or roof), otherwise – urban field;
- 4) vertical farm – i.e. object or its vertical fragments (e.g. wall) located in an urban environment serving vertical cultivation of edible plants (vertical farming).

The architectural concepts and social initiatives that emerge show an increasing interest in UA. Nowa-

days, the subject of UA is present in both social and environmental discourses and it has become a key issue in the idea of sustainable development.

Among the ones distinguished in the typology developed in the paper, the oldest type of UAA is the allotment garden, which is commonly included in spatial plans, also as a type of urban green space. While the colonies of plots are designed by architects, the arrangement of individual plots is left to the discretion of their users. Thus often allotments are a vernacular landscape.

Another type of UAA is a community garden – set up by a local community, on a vacant lot in the densely built environment (Carrot City, 2014; Atelier d'Architecture Autogérée, 2015) or in an open area such as park (e.g. Allmende-Kontor in Berlin). The space of a community garden is usually divided into functional zones, such as agrarian and recreational zones, or it has an open form – within it there are freely placed garden containers, pots and other facilities for growing crops (e.g. Allmende-Kontor in Berlin).

A horizontal farm is a type of an agrarian space, located in the city between buildings (R-Urban, 2012; Atelier d'Architecture Autogérée, 2015), as well as in parks (e.g. farms at Shanghai's Houtan Park), and on the water (e.g. Floating Fields in Shenzhen and Swale

Table 2. Example of an allotment garden – *Schrebergärten* in Leipzig (Germany)

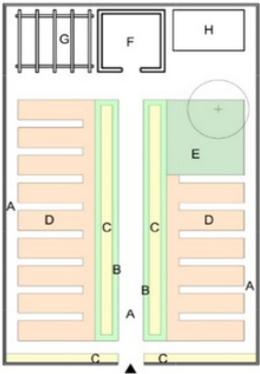
01	ALLOTMENT GARDEN	GERMANY
SCHREBERGÄRTEN		LIPZIG
1. GENERAL INFORMATION		
<ul style="list-style-type: none"> ▪ Address: Aachener Str. 7, 04109 Leipzig, Germany ▪ Built: 1868 ▪ Total area (colony): 26 200 m² ▪ Area (garden plot): 125 m² ▪ Project (colony): M. Schreber, H. Gessel ▪ Project (garden plot): user (tenant), ▪ Financing (garden plot): user (tenant) ▪ Buil by (garden plot): user (tenant) ▪ Management: Deutsches Kleingärtnermuseum ▪ Project goal: playground, gardens for families 		
2. CONTEXT		
<ul style="list-style-type: none"> ▪ Garden colony in an undeveloped area ▪ Functional zone - recreation area ▪ Semi-public space 		
3. ARCHITECTURE		<p>fig.1 Scheme of a typical lot in the Schrebergärten garden colony in Leipzig [original study, based on local visit].</p> <p>Explanations:</p> <p>A – paths, B – decoration hedge, C – decoration flowers, D – edible plants, E – fruit trees, F – summerhouse, G – terrace with construction for grapevine plants, H – composter,</p>
<ul style="list-style-type: none"> ▪ Public square surrounded by garden plots ▪ Public, narrow alleys between plots ▪ Each plot has an arbor 		
		
<p>fig.2 Schrebergärten garden colony in Leipzig - a typical lot (2017, original phot.).</p>		

Table 2 (cont.)

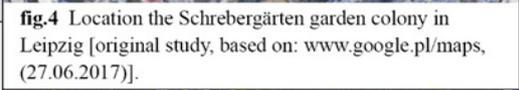
<p>4. FOOD PRODUCTION</p>	
<ul style="list-style-type: none"> ▪ Purpose of production: self-supply ▪ Growing edible plants (herbs, fruits, vegetables) 	
<p>5. OTHER FUNCTIONS</p>	
<ul style="list-style-type: none"> ▪ Recreational and leisure function. ▪ Cultural function: Deutsches Kleingärtnermuseum 	
<p>6. INFRASTRUCTURE AND TECHNOLOGY</p>	
<ul style="list-style-type: none"> ▪ Soil-based ▪ Waste composting 	
<p>7. PROJECT VALUE</p>	
<ul style="list-style-type: none"> ▪ Ecological value: biologically active; water retention ▪ Functional use of green zones ▪ Social value: local place for the community; cultural spot; gardening education; broader access to fruit and vegetables 	
<p>8. SOURCES</p>	
<ul style="list-style-type: none"> ▪ Katsch G., Kosbi H., Kroß E., Leistner K. H., Philipp R., Uschpilkat E., <i>Geschichte des Kleingartenwesens in Sachsen</i>, Drezno 2007. ▪ www.kleingarten-museum.de/en/, (27.06.2017). ▪ www.google.pl/maps, (27.06.2017). ▪ local visit (15.07.2017). 	<p>fig.3 Schrebergärten garden colony in Leipzig - Deutsches Kleingärtnermuseum (2017, original phot.).</p>
	
<p>fig.5 Schrebergärten garden colony in Leipzig - alley between plots (2017, original phot.).</p>	

Table 3. Example of a community garden – Ecobox in Paris (France)

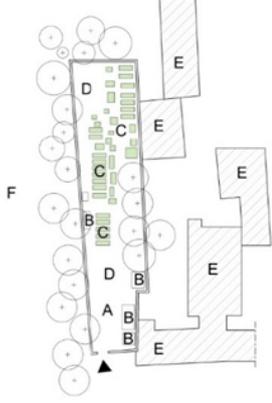
02	COMMUNITY GARDEN	FRANCE
ECOBEX		PARIS
1. GENERAL INFORMATION	 <p>fig.6 Scheme of the Ecobox garden [original study, based on local visit].</p> <p>Explanations: A – entrance zone B – arbors C – plants beds D – leisure zone E – residential buildings F – railway zone</p>	
<ul style="list-style-type: none"> ▪ Address: 7 Impasse de la Chapelle, Paris, France ▪ Built (1st garden): 2001 ▪ Demolished (1st garden): 2005 ▪ Built (3rd garden): 2008 ▪ Total area (3rd garden): 750 m² ▪ Project: Atelier d'Architecture Autogérée (AAA) , gardeners (users) ▪ Financing: Municipality ▪ Built by: Atelier AAA, gardeners (users) ▪ Management: garden cooperative ▪ Project goal: community spot 		
2. CONTEXT		
<ul style="list-style-type: none"> ▪ Plot between residential buildings and the railway infrastructure area ▪ Downtown ▪ Semi-public space 		
3. ARCHITECTURE		
<ul style="list-style-type: none"> ▪ Garden established on a vacant lot ▪ DIY garden containers and leisure architecture 		
 <p>fig.7 Ecobox garden - plant bed (2016, original phot.).</p>		

Table 3 (cont.)

<p>4. FOOD PRODUCTION</p>	
<ul style="list-style-type: none"> ▪ Purpose of production: self-supply ▪ Growing edible plants (herbs, fruits, vegetables) 	
<p>5. OTHER FUNCTIONS</p>	
<ul style="list-style-type: none"> ▪ Recreational and leisure function. 	
<p>6. INFRASTRUCTURE AND TECHNOLOGY</p>	<p>fig.9 Location the Ecobox garden colony in Paris [original study, based on: www.google.pl/maps, (22.07.2016)].</p>
<ul style="list-style-type: none"> ▪ Soil-based ▪ Waste composting 	
<p>7. PROJECT VALUE</p>	
<ul style="list-style-type: none"> ▪ Urban renewal of a vacant lot ▪ Social value: local place for the community; cultural spot; gardening education; broader access to fruit and vegetables, participatory design 	
<p>8. SOURCES</p>	
<ul style="list-style-type: none"> ▪ www.urbantactics.org/wp-content/uploads/2015/09/portfolio-web-2015.pdf, (01.02.2018). ▪ www.ryerson.ca/carrotcity/board_pages/community/ecobox.html, (01.02.2018). ▪ www.google.pl/maps, (27.06.2017). ▪ Local visit (22.07.2016). 	<p>fig.8 Ecobox garden - leisure zone (2016, original phot.).</p>
	
<p>fig.10 Ecobox garden - plant beds along an alley (2016, original phot.).</p>	

in New York) or on the roofs of buildings (e.g. Gary Comer Youth Center in Chicago). The urban farm is mainly used for the cultivation of food crops. Therefore, their plans are optimized in terms of productivity – most of the area is devoted to cultivation, rather than recreation and leisure.

The last distinguished type of UAA is vertical farm, a facility serving vertical agriculture. For the time being, the idea of urban vertical farms is being implemented during the development of prototypes. However, on the basis of theoretical studies (Despommier et al., 2020) and analyzing the first objects created, urban vertical farms were divided into outdoor and indoor urban farms. Outdoor vertical farms are farming infrastructure (e.g. Public Farm One in New York) and crop-friendly building facades (Nowak, 2020) – so-called green walls (e.g. American Food 2.0 in Milan). Indoor farms, however, are buildings with crop area on its storeys (e.g. Pasona Urban Farm in Tokyo).

RECAPITULATION

In the developed typology of UAA, a basic distinction has been made into gardens (community or allotment) and farms (horizontal or vertical). Gardens differ from farms in the simultaneous implementation of agrarian and recreational functions. Farms, on the other hand, are more productive.

Authors' contributions

Conceptualization: A.N. and E.T.L.; methodology: A.N. and E.T.L.; validation: E.T.L.; formal analysis: A.N.; investigation: A.N.; resources: A.N. and E.T.L.; data curation: E.T.L.; writing – original draft preparation: A.N.; writing – review and editing: E.T.L.; visualization: A.N.; supervision: E.T.L.; project administration: A.N.

All authors have read and agreed to the published version of the manuscript.

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TYOLOGIA ARCHITEKTURY MIEJSKIEGO ROLNICTWA

STRESZCZENIE

Tematem artykułu jest współczesna architektura miejskiego rolnictwa, zdefiniowana jako przestrzenie i obiekty zlokalizowane w miastach oraz przeznaczone do uprawy roślin jadalnych. Celem pracy jest omówienie projektów integrujących życie miejskie z produkcją żywności. Zastosowano następujące metody i techniki badawcze: przegląd literatury, studia przypadków, opisy projektów oraz analizy porównawcze. Przedstawiono typologię architektury miejskiego rolnictwa i omówiono reprezentatywne przykłady dla poszczególnych typów.

Słowa kluczowe: miejska farma, miejskie rolnictwo, miejskie ogrody, architektura krajobrazu