

Scientific Report

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Type of scholarship:	Postdoctoral	Application ID:	157716
Duration:	19-07-2021 to 18-08-2021 (1 month)		
Title:	Identification of new trends in development of urban green areas in the context of increasing their social and environmental values – an idea of sustainable development		
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The main purpose of the scholarship was to increase the knowledge about the new trends in development of urban green areas in Budapest related to the enhancement of their environmental and social values, based on case studies (selected public parks) - the representatives of the so-called 'good practices' developed in recent years.

Description of the main work carried out during the scholarship:

Regarding the scholarship to be realized in Budapest as virtual study visit (resulted from the restrictions of COVID-19 pandemic and proposed by Tempus Public Foundation), all works and investigations have been adapted to the remote form. The scholarship has been conducted in relation to the division of stages according to the work plan (below).

Realization of work plan:

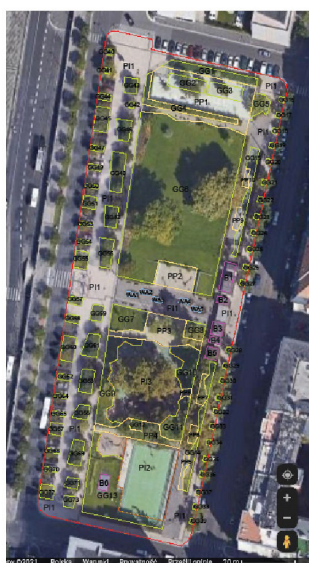
WEEK	STAGE	SCOPE	RESULTS
week 1	THEORETICAL FRAMEWORK	- literature review based on accessible online sources and related to: main aspects of the role of urban greenery for environmental and social development of cities; contemporary urban green areas development in Budapest;	- the sources (including scientific publications, popularizing articles, information from city web pages, design offices, park designs, social media, etc.) accessible online have been reviewed to collect information and prepare the theoretical framework and background for the cases selection as well as to conduct the further detailed research focused on 2 main aspects: environmental and social;
	CASES SELECTION	- due to the remote form of the study, the number of objects selected for detailed research was limited to 3 – urban parks; - defining criteria for cases selection;	- the selection of cases for research was made on the basis of the following criteria: a modern urban park built after 2000, a large green area and diversity of land cover forms, a rich recreation program for different types of users; an important criterion was an online access to descriptive information, photographic documentation and park design/plans; - urban parks selected for the study include: 1. Olimpia Park; 2. Millennium Park; 3. MOM Park;
week 2 and 3	CASE STUDIES	- investigation on 3 parks selected for the study focused on 2 aspects: environmental and social; - preparation of an author's land cover measuring method using data from online maps (Google Map, Google Earth); - detailed data collection of parks (continuation) and data analyses;	ENVIRONMENTAL ASPECT included 2 stages: A. Identification of main land cover elements of each park was made, including: buildings, greenery (on ground; green roofs), pavement (permeable; impermeable), water elements (natural; unnatural). The original method based on the aerial (Google Map) and satellite (Google Earth) photos reading was used to recognize the land cover in the division to above-mentioned types; the measures of all types of land cover have been made using the Auto CAD program; B. Identification of natural elements (diversity of plant structures and species, biodiversity, etc.), and the intensity of their application in parks; SOCIAL ASPECT: Identification and analyses of parks program have been conducted focused on recreational offer (active/passive, organized/spontaneous, etc.), sanitary facilities and security level, as well as social outcomes (local/supralocal impacts, social inclusion/activation, cultural value, educational value, relation to site history, etc.), and the intensity of its application in parks;

week 4	SYNTHESIS OF COLLECTED DATA	- assessment of the studied parks and their recognized features - elaboration of results; - defining new trends in modern parks development in Budapest in the context of social and environmental aspects.	ENVIRONMENTAL ASPECT The results of land cover measures have been summed up; a natural and hard land cover percentage for each park was identified, explaining the share of biologically vital areas , also the plant diversity and general biodiversity was assessed. The detailed results are presented in Table 1 and Figure 1 (a, b, c).
			SOCIAL ASPECT: The results of identified parks program and their analyses allowed the assessment of the recreational offer for users , and at the same time a social attractiveness and outcomes of urban greenery have been recognized. The detailed results are presented in Table 2.

Tab. 1. The assessment of urban parks – environmental aspect – results

No.	Park name	Land cover	m ²	%	Biol. vital area (greenery + permeable pavement) [%]	Diversity of plants:			Biodiversity
						Type	Structures	Species	
1.	Olimpia Park	buildings	118,91	1,09	49,04	trees	XX	XX	XX
		greenery on ground	4262,76	39,13		shrubs	XX	XX	
		permeable pavement	1079,67	9,91		cover plants	XX	XX	
		impermeable pavement	5393,53	49,51		perennials	XX	XX	
		water (unnatural elements)	39,42	0,36		climbers	XX	XX	
		TOTAL AREA:	10894,29	100		lawns	XX	XX	
2.	Millennium Park	buildings	13232,12	29,70	44,70	trees	XX	XX	XX
		greenery on ground	16991,89	38,13		shrubs	XX	X	
		permeable pavement	2926,71	6,57		cover plants	XX	X	
		impermeable pavement	8998,09	20,19		perennials	X	X	
		water (unnatural elements)	2411,19	5,41		climbers	X	X	
		TOTAL AREA:	44560,00	100		lawns	XX	XX	
3.	MOM Park	buildings (without green roofs)	11487,71	40,58	26,76	trees	XX	X	X
		greenery on ground	4279,24	15,11		shrubs	X	X	
		green roofs	3262,75	11,52		cover plants	X	X	
		permeable pavement	36,97	0,13		perennials	X	X	
		impermeable pavement	9217,07	32,55		climbers	X	X	
		water (unnatural elements)	31,72	0,11		lawns	XX	X	
TOTAL AREA:	28315,46	100	utilitarian	0	0				

Degree of application: XX – high, X – medium, 0 – low



a)



b)



c)

Fig. 1. Land cover measures in urban parks – results: a) Olimpia Park, b) Millennium Park, c) MOM park.

Tab. 2. The assessment of urban parks – social aspect – results

No.	Park name	Types of outdoor activities		Organized activities	Possible spontaneous activities	Access	Sanitary facilities	Security level	Social outcomes
		passive	active						
1.	Olimpia Park	XX	XX	XX	XX	XX	XX	XX	- local community activation - special recreational offer for disabled - rich cultural and educational program
2.	Millennium Park	XX	XX	XX (outdoor and indoor)	XX	XX	XX	X	- increased access to green areas in a heavily built-up urban space - supralocal impact (touristic interest) - interpretation of site history - <i>genius loci</i> - rich cultural and educational program
3.	MOM Park	XX	X (occasionally)	X	X	X	XX	XX	- local community activation (inhabitants and office workers, as well as visitors of shopping mall) - increased cultural value related to art program

Degree of application: XX – high, X – medium, 0 – low

The main results on 3 studied modern parks show that both environmental and social aspects become very important for their design and realization making them valuable representatives of urban greenery in Budapest. Those aspects are a basis for parks functioning and complement each other, creating an attractive space for users and at the same time a space improving the quality of urban environment. The results confirm the emphasis on the **sustainable development ideas** in design of contemporary urban parks. In the environmental context, parks have an average share of biologically vital areas (about 50% for Olimpia Park and Millennium Park, and only about 26% for MOM Park). This medium level is compensated by a large variety of natural elements, both plant structures and species recognized mainly in trees and shrubs, but also perennials and climbers, which increases biodiversity. The pro-ecological value is also associated with the use of water-permeable surfaces (pavement), even if their implementation is low in 2 parks (Millennium Park and MOM Park), and/or is compensated by green roofs (MOM Park). This approach proves a conscious search for sustainable solutions and the adaptation of park designs to numerous limitations that exist in highly urbanized space. In the **social aspect**, the parks guarantee accessibility for various types of users. Their programs are varied, but in all cases are attractive for local visitors and even tourists (as in the case of Millennium Park). Even the least extensive program of MOM Park is complemented with a diverse social offer of a shopping mall and a high recreation potential of green areas of surrounding housing estates, which is a great advantage. The main approach of creation those new parks in Budapest in the 21st century is directly related to the diversity of solutions focused on **sustainable development connecting both environmental and social aspects**. This is in line with global trends and at the same time crucial for increasing the scope of ecosystem services provided by parks in highly urbanized areas.

Summing up, the main purpose of the research has been achieved. The results confirmed that the use of the Internet sources may be used as a supporting tool for a quantitative study on the initial identification of land cover as well as recreational offer of urban green areas. The proposed method of measurements is useful for study on biologically vital areas identification. The conducted research may be treated as a pilot study on assessment of environmental and social functions of urban parks or as a first stage of further in-depth research using parallel *in situ* methods to increase the scope of collected data and material for more detailed analysis. The proposed study design may be also applied to other types of urban green areas as well as urban public spaces in general.

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