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METHODOLOGICAL BARRIERS IN SYSTEMIC PLANNING OF URBAN GREEN NETWORKS IN SERBIA

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Abstract
The urban planning practice in Serbia lacks systemic approach to development of urban green networks (UGN), and may support possible divergent developmental trends in planning of UGN and serve as constant drawback in establishing common platform for planning and monitoring of UGN. Thus, this paper introduce potential improvements of the existing methodology by first providing analysis of the critical issues in the current methodological frame and then, reviewing system of qualitative and quantitative indicators in comparison to the examples of good practice from EU cities, it discuses possible improvements of existing methodological frame and indicators, for more systemic development of UGN.
Keywords: urban green networks, indicators, urban planning, Serbia.

1. INTRODUCTION

One of the main goals of spatial and urban planning is environmental protection, through preservation and improvement of the natural capacities in urban settlements. In this context, management and planning of UGN has an important role. In recent decades, Serbian cities had difficulties to reposition themselves during the transition and find sustainable developmental alternative to urban models imposed by the market-oriented development. During this period, problems related to ecology and sustainable development, have remained neglected in comparison to economic and political issues (Guduric 2011). The consequence of this approach is the critical implementation of urban plans, in terms of negative treatment of the natural environment in urban centers, through disappearance of

public and green spaces, and consequently reduction of quality of living environment. The fact that underpins such trend is the lack of understanding of the benefits of urban greenery. But, despite the common question among decision makers, as Heidt and Neef (2008) point out, how we can quantify the benefits of urban greenery, there are numbers of studies that prove the contribution of UGN to the quality of life and ecosystem services in cities, or the negative efects of UGN inadequate treatment.

The replacement of green areas have negative effects on the ambient environment, at first place with the reduction of evapotranspiration, and increased heat accumulation (Goward 1981, Wilson et al. 2003). The greater share of artificial impervious surfaces over the natural land cover in urbanized environment is considered as the main cause of urban heat island (UHI) effect (Onishia et. al. 2010). As Oke (1987) comments, UHI is the best documented example of human climate modification. Increased ambient temperature have multiply negative consequences on local environment and human health. Investigating relation between 'heat islands' and 'death islands' Buechley et al. (1972) found that mortality rate increases with rise of temperature. In some extreme cases mortality can increase up to eight time caused by heat wave (Chen et al. 2013). For example, it is estimated that the heat waves in Europe in 2003, took nearly 35,000 victims, mostly in urban areas (Larsen 2003). Land cover changes influence not only a heat balance, but also have a negative effects on the landscape aesthetics, energy efficiency, human health and quality of life (McPherson et al. 1997, Yue et al. 2007). For instance, the increased local ambient temperature is closely related to the peak electricity usage, due to increased demand for electricity for air-conditioning. With rise in temperature, electricity generation rises, where, besides the greater economic costs that consequentely occur, the emission of various greenhouse gases, which contribute to global warming and climate change (Heidt and Neef 2008), occure as well.

Urban vegetation has profound effect on temperature balans in urban settings. Many studies refers to what Luber and McGeehin (2008) call ”cool cities” concept or urban greening as a strategy to mitigate the consequences of higher temperatures, and thus reduce greenhouse gas emissions (Bowler et al. 2010, Givoni et al. 1991). While documented air temperature differences between areas of tree cover and nearby urban surroundings is about 2–4 °C (Jauregui 1990, Spronken-Smith and Oke 1998), surface temperature difference in the same area can go over 15° (Chen et al. 2013). Furthermore, solar radiation in the trees' shade can be lower for 10% (Givoni et al. 2003). Also vegetation and trees can lower annual cooling and heating expenses. Study shows that energy savings in heating and cooling ranges from 20-30% (Ting 2012, Gago et al. 2013, McPherson et al. 1999). On the other side, urban greenery have substantial effect on human health and well being in cities. The exposure to green view or access to green space is indirect remedy for psychological disorders, and may help in promoting emotional recovery, reducing cognitive fatigue, anxiety, buffering the impact of stress on urban residents

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(Agyemang et. al. 2007, Maller et. al. 2006, Wells 2010) and reducing inter-family violence and crime (Kuo and Sullivan 2001). Moreover, the urban vegetation ameliorates the climate, filtering the air, water, and soil of many pollutants, serving in same time as dispersion corridors for flora and fauna and contributing to higher biodiversity in cities (Heidt and Neef 2008), even in the cas of small urban green spaces (Meyer 1997). And finaly, in economic terms, studies indicates that both the quality and the quantity of green space affect positively property values and financial return to developers (Cicea and Pirlogea 2011).

Considering above mentioned, we can agree that the planning of UGN has to be on the top of planning agenda, if we want to make step forward towards sustainable urban forms. In order to utilize maximum UGN benefits, systemic approach in planning and designing of the urban green system is necessary. In this regard, considering the rising importance of urban indicators (Pissourios 2013), we can agree that understanding the methodological framework for planning and designing UGN, and related system of qualitative and quantitative indicators, plays a key role in the meaningful development of UGN. Therefore, the objective of this study is to analyze the effects of planning methodologies on definition and consistence of the quantitative and qualitative indicators for planning and designing of the UGN in Serbia on different spatial levels, and suggest possible improvements.

2. METHODS

In order to understand critical points in methodologies for planning of UGN in urban centers in Serbia, the methodology for this research relays on a comparative analysis of two clusters of European cities and five urban centers in Serbia. We have chosen to concentrate on the following empirical data sources: in case of Serbia –1) Spatial Plan of Republic of Serbia (SPRS)[1] 2) Master plan (MP) of Belgrade 2021[2], 3) MP Novi Sad 2021[3], 4) General urban plan (GUP) Niš 2010-2025[4], 5) MP of Subotica-Palić 2020[5], and 6) GUP Kragujevac 2015[6], and in case of EU - 1) CAT-MED[7] Sustainable Urban Model-Work methodology and results (Cots et al. 2012) and 2) application material of the cities

[1] Prostorni plan republike Srbije 2010-2014-2021, Ministarstvo Zivotne Sredine i Prostornog Planiranja, Republicka agencija za prostorno planiranje, Beograd, 2010
[2] Generalni plan Beograda 2021, "Sl. list grada Beograda" br. 27/03.
[3] Generalni plan Novog Sada *do 2021*. Godine, "Sl. list grada *Novog Sada"* br. 39/06.
[4] Generalni urbanisticki plan Nisa od 2010-2015, "Sl. list grada Nisa" br. 43/11.
[5] Generalni Plan Subotica-Palic 2020, "Sl. list opštine Subotica, br. 16/2006, 17/2006 ispr. i 28/2006"
[6] Generalni Urbanisticki Plan Kragujevca do 2015, Sl. list Grada Kragujevca, br. 3/02.
[7] CAT-MED is transnational initiative with objective to set the platform for defining the Mediterranean sustainable city model, identifying the sources of climate change and advocating the solutions. Institutional frame comprise the municipalities of 11 Mediterranean cities, with project objective to favor synergies between two levels: the local level and the transnational level

candidates for European Green Capitol material (www.ec.europa.eu/environment/europeangreencapital)[8], considering both winners and some of the applicants cities. Based on a given sources we identify common indicators in Serbian cities, and compare them with indicators from the reference cities. Considering comparison implications, afterwards, we discuss critical issues in the existing methodology in Serbia and suggest possible improvements.

3. DISCUSSIONS

Methodology and policy frame for planning and designing of UGN

Treatment of green areas (GA) is present at all levels of spatial and urban planning in Serbia. The Spatial Plan of Republic of Serbia (SPRS) recognizes the problems of GA in terms of prominent loss of green and open spaces in urban centers and the degradation of public space, and its use for new developments, which further leads to decrease in the ecological quality of the built environment and the imbalance in the sustainability of the city (Law on Spatial Planning of Republic of Serbia, 2010)[9]. Furthermore, it also recommends the creation of UGN links between urban and sub-urban areas, but it doesn't suggest methodological frame (for instance the creation of UGN in line with climate change effects).

In similar manner, the definition of GA is partially present at the regional level, through clause in a certain sections of the regional spatial plans in terms of suggestions such as: raising the protective vegetation along the roads and around industrial plants, increasing the share of green space with proper spatial distribution, create a network of green and public spaces which connect to natural and cultural values of the settlements, improving the ecological corridors within the built up area by establishing the continuity of green spaces, etc

At the local planning level, the UGN are worked out more in details in GUPs and MPs, within the general requirements for the development and spatial organization of urban areas and public areas and facilities. The GUPs and MPs are strategic development plans, with the general elements of spatial

[8] European Green Capital Award (ECGA) is one of the policy tool that European Commission is using to address environmental challenges, recognizing local effort in improving quality of life in cities, and it is underpinned by 7th Environmental Action Program (EAP). The objective of EGCA is to establish environmental role models among EU cities, which will inspire other cities to boost their efforts towards a greener urban environment by sharing experiences and promoting best practice.
[9] Zakon o prostornom planu Republike Srbije ("Sl. glasnik RS", br. 88/10)

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development, with the legal basis in The Law on Planning and Construction from 2009 (LPC)[10] and The Ordinance on the content, method and procedure of planning documents from 2010[11]. The MP of Belgrade, Novi Sad and Subotica-Palic rely upon the methodology of The Law on Planning and Construction 2003[12], while the GUP of Niš and Kragujevac use the methodology of The Law on Planning and Construction 2009[13].

Neither SPRS nor act and rules within mentioned documents define a specific methodology for the planning of UGN, neither provides overarching frame or guidelines. The planning legislations at the higher spatial level recognize the problem of UGN just in terms of recommendations. Consequently, as the analysis of MPs and GUPs of the cities of Belgrade, Novi Sad, Nis, Kragujevac and Subotica points out, at the local level, methodological frame is weakly defined and differ case-by-case.

However, in addition to formal instruments defined by legislation, cities in Serbia are involved in various projects in the analysis and improvement of UGN. City of Belgrade is involved in project "The Green Regulation"(Projekat "Zelena Regulativa Beograda"-IV faza) initiated by the Secretariat of Environment of Belgrade and with institutional support by the city of Belgrade. The project aims to improve the regulation and management of UGN in Belgrade, its planning, development, maintenance and protection. Similar project is conducted by the Planning Institute of Subotica (Projekat „zelena regulativa Subotice"- prva faza projekta) with objective to create inventory UGN data base, define the challenges and suggest solutions for the improvement of existing situation.

In case of the selected benchmark clusters of CAT-MED and European Green Capital (EGC) cities, the environmental and spatial characteristics of GA have been treated within the methodological frame built upon the overarching theme of environmental sustainability and the climate change, and evaluated on the city's state of the environment within the axis of territorial management and urban design – CAT-MED, and green urban areas and sustainable land use - EGC. However, in both cases in general, GA has been just evaluated based on recommended indicators, but specific methodological frame for UGN can't be recognized. There are instances within the CAT-MED pilot projects Green Apple, as it is a case with Attica region, where GA is considered within more systemic approach such as green network model combined with traffic regulations. In case of EGC cities, the represented results are often selected information underpinned with different studies at the local level. The main characteristic, in

[10] Zakon o planiranju i izgradnji ("Službeni glasnik RS", br. 72/09, 81/09-ispravka, 64/10-US, 24/11, 121/12, 42/13 – odluka US i 50/13 – odluka US)
[11] Pravilnik o sadržini, načinu i postupku izrade planskih dokumenata ("Službeni glasnik RS", br. 31/10, 69/10 i 16/11).
[12] Zakon o planiranju i izgradnji ("Sl. glasnik RS", br. 47/2003 i 34/2006)
[13] Zakon o planiranju i izgradnji ("Sl. glasnik RS", br. 72/09, 81/09, 64/10-US, 24/11, 21/12)

both cases, is joint effort at transnational level to improve the environmental performance of the city, and thus, the performance of UGN.

Methodology for the measurement of UGN performance

The effects of weakly defined methodologies are noticeable on definition of quantitative and qualitative indicators for planning and designing of UGN in Serbia, and their consistence between the cities. As the planning legislation does not provide nor require precisely defined methodology and the related system of indicators for the planning of GA while making MPs and GUPs, developed indicators are the result of individual approaches adopted by each city. Therefore, cities have applied different methodologies, and their own set of qualitative and quantitative indicators, which in some cases overlap between the cities but not as the result of joint planning among them. In terms of parameters for qualitative capacities of UGN in Serbian cities, we can't discus qualitative indicators, since the analyzed plans recognize just vegetation categories and types of greenery, such as parks, recreational green spaces, urban woods and similar, and the requirements for the organization of area by categories and location, treated with the greater or lesser degree of detail.

Some of the categories are the same between the cities (i.e., parks), but single categorization doesn't exist and consequently consistence in qualitative definition between the cities (Table 1).

TABLE 1 - QUANTITATIVE CATEGORIES FOR PLANNING OF UGN IN SERBIAN CITIES

Belgrade (BG), Nis (NI), Novi Sad (NS), Subotica-Palic (SU), Kragujevac (KG)
• Types/categories of green (BG) (NS) (SU) • Green types by city zones (BG) • Types/categories of green zones (NI) (KG) • Types/categories of green within the urban area (SU)

When it comes to quantitative indicators, the effect of weak methodology is noticeable even more. The number of indicators used while planning of GA differs noticeably case-by-case. For instance, Novi Sad relies on four, while Subotica and Belgrade rely on six and nine indicators for the planning of GA. In total, analysis recognizes seventeen quantitative indicators (Table 2).

The hierarchical definition of indicators in relation to different spatial levels (city level, urban area or building lots) varies from plan to plan. More clearly defined hierarchy can be identified in the plans of Belgrade, Nis and Subotica. Furthermore, definition of indicators, both terminology wise and in terms of what indicator actually indicates, is different for different cities. For example, a total percentage of GA in case of Belgrade and Nis is defined in comparison to MP / GUP area, while in case of Novi Sad and

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Kragujevac is defined in comparison to total built up area. Moreover, agreement on what is considered as GA in calculating total percentage is also different for each case.

Nevertheless, we can identify a few common indicators, which are in use in all cases: 1) the planned green area, 2) the percentage of the planned area under vegetation in relation to the planned area for the construction or GUP, and 3) the min percentage of green area within the lot for specific purpose. Also all five cases recognize planned green area under defined GA categories. Some cities such as Belgrade and Subotica developed this indicator further according to the planned green areas by location within each category. Other indicators vary case-by-case.

As it was stated in previous section, both EGC and CAT-MED methodologies favor integrated approach at local and transnational level. Thus, they measure green urban areas as an element within the group 12 (20) city sustainability (environmental) indicators.

In both cases the definition of a common system of urban sustainability indicators enables tracking of the evolution of entire urban system in time. This approach helps cities to monitor progress towards the defined sustainable models as indicators are consistent between each other and allow comparison between the cites.

Both methodologies recognize the importance of planning of urban green areas in terms of sustainable land use and territorial management.

They measure green areas using the common system of quantitative indicators: 1) the green zones and recreation areas per inhabitance, 2) the green zone density - percentage of green zones and recreation areas in comparison to total urban area (green zone density) and 3) the green zone proximity-inhabitants that live next to a green zone per total number of inhabitance. Both methodologies highlight the importance of distribution of GA, as proximity and accessibility in fact play more important role then the total amount of green areas.

This indicator describes / measures also the real exposure of the inhabitance to GA and the pattern of growth of green area within built up area. Even though the qualitative features of GA provide finer definition of its capacity to ameliorate local climate, it is interesting that both methodologies lack qualitative indicators.

TABLE 2: QUANTITATIVE INDICATORS FOR GA PLANNING IN SERBIAN CITIES

Belgrade (BG), Nis (NI), Novi Sad (NS), Subotica-Palic (SU), Kragujevac (KG)	
• The total planned green area (ha) (BG, NS, NI, KG) • Incrcrease of green area surface (ha) (BG) • The total planed green area / urban area (Master Plan Area) (%)(BG, NI) • The planned green area by categories (ha) (BG, NI, SU, KG) • The planned green areas by location within the category (ha) (BG, SU, KG) • Green area / Building block surface area (%) (BG) • Green area / lot surface area according to zones (%)(BG) • Green area / building complex with specific function (%)(BG) • Green area / Number of Inhabitance (m^2/per capita) (BG, SU, KG)	• Planned green area / Planned construction area (%) (NS, KG) • The minimum width of the external protective green belt along the edge of the construction area (m) (NS) • Green area / Building lot (%) (NS, KG) • Planed green area by category / GUP area (%) (NI) • Planed green areas of specific category / Planned green area (%) • Planned green areas according to category within urban zone (ha) (SU) • Depth of green buffer layer (m) (SU) • Min green area within the block (m^2/per capita) (SU)

Comparison of UGN indicators' values

According to green zone density, Serbian cities are expectably more similar to Mediterranean cities, where the most of cites has value of approximately 5% of green area density or below, except in case of Rome, Turin, Barcelona and Valencia. On the other side, in comparison with EGC, Serbian cities have almost the marginal amount of total green area in relation to urban area, except in case of Nantes and Hamburg. For instance, despite the scale of the city, Stockholm and Frankfurt have 68% and 52%, while Kragujevac and Subotica are hardly close to 5% of green area density. It is highly probable that one of the main arguments of such values of this indicator, apart from other management issues, has to do with the climate issues. Serbia is a country in the background of Mediterranean region, and the average annual temperature in Serbia and Mediterranean is higher in comparison to central and northern Europe, where the most of EGC are located, which affect maintenance, and consequently planning of GA.

When it comes to green space per capita, analysis shows very high values for Serbian cites. Namely, the amount of green space per capita in Kragujevac, Subotica and Novi Sad together with Rome are among the highest in this comparison group and close to average in EGC group together with Bristol and Victoria-Gasteiz. But here is not the high values itself that draw attention, but rather the disproportion between the green space per capita and the green space density in case of Serbian cities.

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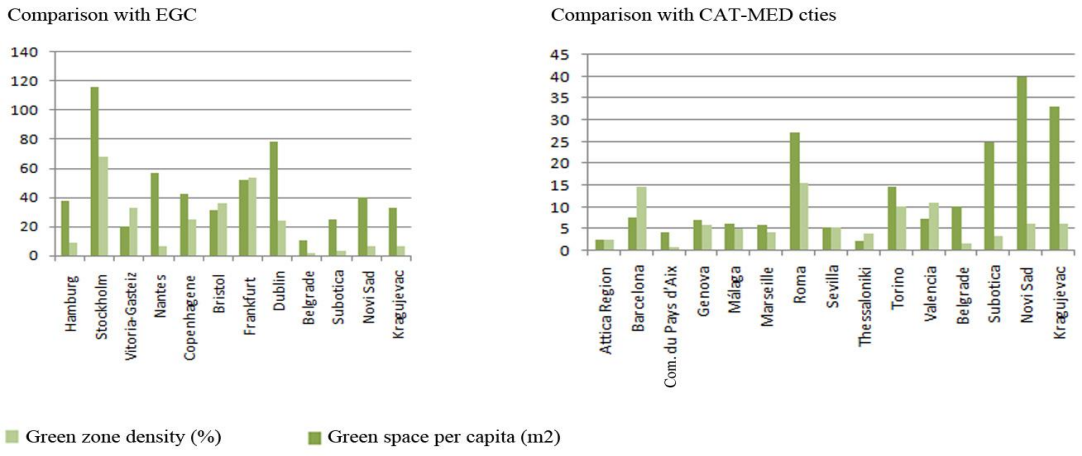
In most of cases the amount of green space per capita is respectively high / low to green space density, and obviously depends of the population density in particular city. But prominent discrepancy between those two indicators, in case of Serbian cities, suggests that different methodologies might have been used while calculating two mentioned indicators, with most likely overestimated amount of green space. Even Stockholm, which has the highest share of green space and green space per capita among European cities, does not have such noticeable disproportion of those two indictors.

This discrepancy points to a possible presence of administrative overestimation of the given values of GA in plans, in terms of what types and GA coverage within the municipal borders has been considered in the evaluation process, in relation to the actual percentage of municipal GA. It can be assumed that such projections occurs because current practice in Serbian cities lacks the green area proximity indicator that reflects the distribution of presented GA and that might works as corrective indicator for GA other indicators. For instance if the proximity indicator value is very high, it means that total green area is well distributed across the city in respect to inhabitances. In contrary low level suggest whether the insufficient amount, bad distribution of GA or that wide green ring around cities has been taken into account in the calculation process. Thus, it can prevent to a certain degree overestimation of GA. Cities considered as role models have very high values of this indicator. For example, all EGC have between 90 and 100% of inhabitance who lives in proximity of less than 300m to closest green space. The same intervals are set as a goal for analyzed Mediterranean ciites.

TABLE 3 - COMPARISON OF GREEN SPACE PER CAPTIA AND GREEN ZONE DENSITY IN SERBIAN CITES WITH ECG AND CAT-MED CITES



Source: EGC www.ec.europa.eu/environment/europeangreencapital, CAT-MED www.catmed.eu,
MP Belgrade 2021 (Sl. list grada Beograda br. 27/03),
MP Subotica Palic 2020 (Sl. list opštine Subotica, br. 16/2006, 17/2006 ispr. i 28/2006)
GUP Kragujevac (Sl. list Grada Kragujevca, br. 3/02), Study of Green and Recreational areas for Novi Sad
(www.atisma.home.xs4all.nl/Studija%20zelenih%20i%20rekreativnih%20povrsina_print.pdf)

4. CONCLUSIONS AND RECCOMENDATIONS

The study provides an insight in the planning and design frame for UGN in five Serbian cites and its comparison to the UGN indicators 'benchmark' in European cities. It provides basis for further research, as well as information for the methodology and policy improvement.

The methodology of evaluation and related set of indicators in the EGC and CAT-MED cities highlight critical points in the methodologies and indicators for planning and designing UGN in five Serbian cities. Firstly there is an evident difference between the Serbian cities' regarding approaches and the lack of clearly defined methodological frame, structured guidelines or requirements in the plans and legislation on the national level for planning and designing of UGN at the local level. While in the same time, in the frame of international researches and development projects, with objective to embark on a visioning sustainability process, we can see a tendency of integrated methodologies at the transnational level under the umbrella of environmental excellence in case of EGC and CAT-MED cities. Secondly, differences in methodologies, in case of Serbian cities, have produced different number of indicators in each city. On one side, at the city level, this can be beneficial, since it can reflect/address the local specificity of GA. On the other side, at the national level (between cites), this may support the possible divergent developmental trends in planning of UGN and serve as constant drawback in establishing common methodological platform for monitoring and planning of UGN. The defined common GA indicators, as it is a case across the EGC and CAT-MED cities, allow the monitoring of the progress towards defined environmental objectives, both in case of the city itself and inter-cities comparison.

In line with the international discourse, the involvement of city government in issues about their local environment, and consequently the role of UGN play in it, city of Belgrade, Subotica and Novi Sad, which have undertook additional research on UGN within their municipalities, show high awareness and can serve as role model to other Serbian cities. Even though they are instances of a good practice, yet, they are isolated examples, and still additional step has to be made towards more strategic and comprehensive approach to UGN. Certainly the first step in overcoming methodological barriers, towards more systemic treatment of UGN, is the formation of institutional and professional consensus in relation to it, which involves the improvement of the existing legal and planning framework especially at local level. The strength in case of existing state is that the treatment of GA in spatial and urban planning in Serbian is present at all levels of planning. Additional strength is the strong institutional support of some cities to this problem, which prove the increasing awareness and understanding of UGN importance in city development among city officials. Furthermore, this is opportunity for increase of the financial support for development of UGN at the local level. On the other side, the weakness is

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the unequal treatment of UGN in urban planning practice in different cities, considering the mainstream practice, and the lack of interest of local governments in this topic, which may lead to the failure of implementation of UGN plans.

Improving the methodological fame for planning of UGN should bring measures that at first place considers consistence in planning approaches on different spatial and organizational levels. In that sense we suggest the following:

1. The definition of overarching methodological framework for the treatment of UGN in the legislation (SPRS and LPC) such as environmental sustainability or climate sensitive planning, both at the national and local level. This methodology will help the treatment of UGN as a part of the wider system of environmental policies. It goes in line with current SPRS that point out the necessity of updating the instruments and policies for integration of climate change issues in spatial and urban development. Such a legal framework will allow city planning institutions to harmonize current methodologies, improve coordination between the cities regarding the UGN issue, and raise awareness about the importance of UGN in ameliorating the effects climate change. Furthermore, it would create an opportunity for adequate definition of the common system of indicators and consequently the better physical and functional treatment of UGN, avoiding a multiply interpretation of indicators and related problems in implementation;
2. The alignment of the system of indicators with the practice of planning of UGN in EU cities. This will give a possibility to Serbian cities to compare their progress with role models in EU and beyond, and in that way constantly improve practice at the local and national level. But firstly, we have to define common categories of green space that will be considered in the calculation of indicators such as Green area density and Percentage of green area per inhabitance .The synchronization of categories will allow creation of common inventory of UGN and consequently its better understanding of it at the local and national level. Secondly, we suggest the introduction of green area proximity indicator as indicator that reflects the distribution of presented GA and, as we explained, works as corrective indicator for GA and it is priority indicator for the evaluation of UGN organization; and
3. The establishment of common GIS platform at the national and local level. GIS platform will create opportunity for: a) the integration of local and regional climate change effects in the improvement of existing and definition of new indicators for planning and designing of UGN such as green space proximity indicator, and b) allow the monitoring progress towards defined

objectives and UGN models in relation to other environmental indicators within and between the cities.

REFERENCES

Agyemang, C., van Hooijdonk, C., Wendel-Vos, W., et al. (2007). The association of neighbourhood psychosocial stressors and self-rated health in Amsterdam, the Netherlands. *J Epidemiol Community Health*, 61(12), 1042–1049.

Bowler, D.E., Buyung-Ali, L., Knight, T.M. & Pullin, A.S. (2010).Urban greening to cool towns and cities: a systematic review of the empirical evidence. *Landscape and Urban Planning,* 97 (3), 147–55.

Buechley, RW., Van Bruggen, J. & Truppi, L.E. (1972). Heat island equals death island? *Environ Res*, 5(1), 85–92.

Chen, D., Wang, X., Khoo, Y.B., Thatcher, M., Lin, B., Ren, Z., Wang, C. & Barnett, G. (2013). Assessment of Urban Heat Island and Mitigation by Urban Green Coverage. In A. Khare and T. Beckman (eds.), *Mitigating Climate Change*, Berlin: Springer, 247-257.

Cicea C. & Pirlogea C. (2011) Green Spaces and Public Health in Urban Areas, *Theoretical and Empirical Researches in Urban Management*, 6(1), 83-92.

Cots, P.M., Hebert, M.S, Bossio, S.N. & Munoz, R.B. (2012). *CAT-MED Sustainable Urban Model-Work methodology and results*. Malaga: Urban Environment Observatory – OMAU

Gago, .E.J., Roldan, J., Pacheco-Torres, R. & Ordóñez, J. (2013). The city and urban heat islands: A review of strategies to mitigate adverse effects. *Renewable and Sustainable Energy Reviews*, http://dx.doi.org/10.1016/j.rser.2013.05.057, 749–758.

Givoni, B., Noguchi, M., Saaroni, H., Potchter, O., Y. & Feller, N. (2003). Outdoor comfort research issues. *Energy and Buildings,* 35 (1), 77–86.

Givoni, B. (1991). Impact of planted areas on urban environmental quality: a review. *Atmospheric Environment* 5B 25 (3), 289–99.

Goward, S.N. (1981). Thermal behavior of urban landscapes and the urban heat island. *Physical Geography,* 2 (1), 19–33.

Guduric, I., Tomicevic, J. & Konijnendijk, C.C. (2011). A comparative perspective of urban forestry in Belgrade, Serbia and Freiburg, Germany. *Urban Forestry & Urban Greening,* 10 (4), 335-342.

Heidt, V. & Neef, M. (2008). Benefits of Urban Green Space for Improving Urban Climate. In M.M. Carreiro et al. (eds.), *Ecology, Planning, and Management of Urban Forests: International Perspectives*, Berlin: Springer, 85-96.

Jauregui, E. (1990). Influence of a large urban park on temperature and convective precipitation in a tropical city. *Energy and Buildings* 15 (16), 457–463.

Kuo, F.E. & Sullivan, W.C. (2001). Aggression and violence in the inner city: effects of environment via mental fatigue. *Environmentand Behavior,* 33 (4), 543–571.

Kuo, F.E. & Sullivan, W.C. (2001). Environment and crime in the inner city: does vegetation reduce crime? *EnvironmentandBehavior,* 33 (3), 343–367.

Larsen, J. (2003). Record heat wave in Europe takes 35,000 lives. Eco-Economy Update. Washington DC: Earth Policy Institute.

Luber, G. & McGeehin, M. (2008). Climate change and extreme heat events. *American Journal of Preventive Medicine,* 35 (5), 429–435.

Maller, C., Townsend, M. & Pryor, A. (2006). Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International,* 21(1), 45–54.

McPherson, G., Simpson, J.R., Peper, P.J., & Xiao, Q. (1999). Benefit-cost analysis of Modesto's municipal urban forest. *Journal of Arboriculture,* 25 (5) 235–248.

Meyer, J. (1997). *Die zukunftsfaehige Stadt. Nachhaltige Entwicklung in Stadt und Land.* Düsseldorf: Werner Verlag.

Oke, T.R. (1987). *Boundary layer climates*. *2nd ed*. London: Routledge, 435.

Onishia, A., Xin Caob, X., Ito, T., Shia, F., & Imuraa, H. (2010). Evaluating the potential for urban heat-island mitigation by greening parking lots. *Urban Forestry & Urban Greening,* 9 (4), 323–332.

Pissourios, A.I. (2013). Whither the Planning Theory–Practice Gap? A Case Study on The Relationship Between Urban Indicators and Planning Theories, *Theoretical And Empirical Researches In Urban Management*, 8 (2), 80-92.

Projekat "Zelena Regulativa Beograda", IV faza - Plan generalne regulacije sistema zelenih povrsina Beograda. Sl. List grada Beograda", бр. 57/09, JUP Urbanisticki Zavod Beograda.

Projekat „Zelena regulativa Subotice",prva faza projekta Prikaz i analiza stanja zelenih površina subotice i predlozi za njihovo unapređenje" (2012). JP Zavod za urbaizam grada Subotice.

Spronken-Smith, R.A. & Oke, T.R. (1998). The thermal regime of urban parks in two cities with different summer climates. *International Journal of Remote Sensing,* 19 (11), 2085–2104.

Tisma, A., Ninic-Todorovic, J. & Ognjanov, V. (2009). Studija zelenih i rekreativnih povrsina – u cilju izrade revizije generalnog plana Novog Sada 2031. JP „Urbanizam", Novi Sad

Ting, D.S. (2012). Heat Islands – Understanding and Mitigating Heat in Urban Areas. *International Journal of Environmental Studies*, 69 (6), 1008-1011.

Wells, N.M., Evans, G.W. & Yang, Y.Z. (2010). Environments and health: planning decisions as public-health decisions. *Journal of Architectural and Planning Research,* 27 (2), 124–143.

Nikolić, M. (2010). Srbija pred izazovom globalnih klimatskih promena i njihovih posledica. Klimatske promene – studije i analize. Beograd, Evropski pokret u Srbiji.

IPCC, (2007). IPCC Fourth Assessment Synthesis Report: Climate Change 2007.