



DOI: 10.21005/pif.2020.42.C-02

CONCEPTS OF "BIOPHILIA" AND "LIVABILITY" IN THE CONTEXT OF SOCIAL PERCEPTION OF PUBLIC SPACE IN CITIES

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ABSTRACT

The work concerns the concept of biophilia and livability in the planning of public space and using that space by urban residents. The authors refer to theories discussing human-nature co-relations and sustainable planning. Nature-based solutions and multisensory of space issues are also presented, and examples of pro-ecological programs and solutions in cities are given. The work is the result of initial research undertaken by scientists from Poland, Slovakia, and Serbia, and carried out as part of larger research in the COST Action CA13177 Circular City - Implementing nature-based solutions for creating a resourceful circular city.

Key words: biophilia, livability, walkability, multisensing, smellscapes, soundscapes, sustainability.

1. INTRODUCTION

During rapidly growing, often unfavorable changes in urban space, it is very important to approach ecological planning and to pay attention to the simultaneous positive perception of the environment by residents in the context of living together with nature. The issues of ecology in urban planning are obviously not something new, but in the era of climate change, in particular, and recently the global pandemic, are taking on special significance. The global crisis of air quality and other environmental issues in cities (such as heat islands, water quality, urban runoff management, etc.) especially in areas of intensive traffic and housing zones, threaten the urban population. The C40 Cities Climate Leadership Group reported that the concentration of PM2.5 particles could be increased by 50% but also temperature increase in cities 2-5°C by 2050. This could dramatically affect human population health in the future and the well-being in megalopolises.

Biophilic urban design can provide a base for increasing the resilience of urban spaces and increase the capacity of the population in cities to cope with different disasters and scarcity. Global research in urban agglomerations suggests that ecosystem services that are provided by green spaces and urban vegetation (especially by trees) will be crucial in the future addressing the problems of air pollution in conditions of global warming (The Nature Conservancy, 2016). Scientific research in ecology and climatology gives the base for further application in the planning process towards the development of urban adaptable ecosystems. One of them is the integration of green infrastructure as a polyvalent space for ecosystem services and human well-being (Simić et al., 2016). Mankind is inseparably connected with nature and only deep understanding and respect for the value of the natural environment and a balanced approach to the use of natural resources and processes can allow the normal functioning of the societies of many countries.

The article discusses the theoretical concerns and considerations on the concepts of biophilia and livability in the context of public space planning in cities. The article focuses on the issues of the relationship between human beings/society and nature, as well as the planning of urban space in terms of ideas related to biophilia and livability. Particular importance is given to the aspects of social perception of public spaces through the connected concepts, new trends and design tendencies as walkability, activity in public space, multisensing, smellscapes, soundscapes, and green therapy. The work is the result of initial research undertaken by scientists from Poland, Slovakia, and Serbia, and carried out as part of larger research in the COST Action CA13177 Circular City - Implementing nature-based solutions for creating a resourceful circular city.

2. THE CONCEPT OF BIOPHILIA

An attempt to determine the psychological relationship between man and nature was made in 1973 in Fromm's *Anatomy of Human Destructiveness* (Fromm, 1973). The author defines biophilia as a love of life, a kind of attitude that is expressed in thoughts, deeds and feelings, and the condition for its development is being surrounded by people with a similar perception of the environment, independence and the opportunity to develop their own separateness (Wachaczyk, 2005). A slightly different perception of this term was presented by Wilson, who at the same time popularized and extended the biophilia hypothesis. The author in the book *Biophilia* from 1984 defines this concept as a desire to contact nature and all living things (Wilson, 1984). This need is the result of evolution and the constant presence of nature in human life, which is partly genetic. According to him, biotic elements of the environment had a significant impact on the formation of cognitive processes in humans (Krcmarova, 2009).

In *The Biophilia Hypothesis*, of which Wilson is a co-author (Kellert and Wilson, 1995), Kellert defines biophilia as a proper attachment to various life forms and related processes, which is an inherent phenomenon, biologically and evolutionarily conditioned, and its effect is, among others, the need to protect and care for elements of nature and biodiversity (Kellert, 1995). There are also reflections on biophilia, presented by specialists in various fields, which develop and redefine the meaning of this concept. They refer to processes related to the natural environment, which determines the emotional, cognitive and aesthetic development of man (Kellert and Wilson, 1995). Noteworthy is the part by Ulrich, in which the author presents the positive and negative effects of

addiction to nature (Ulrich, 1995). The book also presents the impact of cultural conditions on the perception and treatment of the environment, the role of nature in metaphorical terms and the relationship between biophilia and evolution. The theory of love of nature as a natural feature of man is considered in the context of ethical relations with nature and social changes. It is important to increase people's awareness and create new solutions in the sphere of politics that will prevent environmental degradation on a large scale (Kelert and Wilson, 1995). The definition of biophilia, formulated by Wilson, became a source of reference for further considerations, including those conducted in the context of urban planning. Many authors presented different approaches to design in the spirit of biophilicity, and their proposals were published in the form of extensive publications as well as online texts.

Significant studies on biophilic cities belong to Beatley, who focused on finding solutions that would limit the negative impact of urban agglomerations on the natural environment. In the book *Biophilic Cities: Integrating Nature into Urban Design and Planning*, the author first describes the role of nature and its unpredictability in an urbanized environment (Beatley, 2011). It presents the city as a living environment for many species, often invisible on a daily basis. Beatley also defines what a biophilic city is, which is not only properly designed and developed, but also operates according to specific rules. Its essence is to create a living environment that encourages its inhabitants to connect with nature, creates a sense of belonging to the place, and its priority is the repair and restoration of ecological structures. Such a city also cares about infrastructure and institutions that allow for education and promote links with nature. Beatley describes the tools and strategies to be used, supporting them with examples from North America, Europe or Australia. These are both large-scale planning studies and solutions for individual buildings. The author also attempts to characterize activities that go beyond physical planning and design. He describes institutions and organizations as well as programs that can help in the implementation of biophilic solutions (Beatley, 2011). Beatley raises similar issues and again defines the most important benefits of urbanism in the spirit of biophilic city and tries to explain the nature of biophilic city. At the same time, the author indicates that elements of nature improve the conditions of urban life and presents biophilic cities as centers resistant to adverse external factors and harmful phenomena. The book also focuses on the examples of Biophilic Cities network, which allows to see how diverse and different these centers are, and the solutions implemented in them can become an example to others. It presents a number of issues relevant to the idea of the program, i.e. biophilic plans and codes, involvement of residents and the community, restoring nature to the urban fabric and other urbanism strategies. It also outlines lessons that can be learned from the solutions implemented so far and presents a vision of cities of the future that will develop in accordance with the assumptions of the program.

Beatley and Newman (2013) present biophilic design elements used at various scales. Further, the authors focus on the essence of sustainable development, while trying to prove that it is closely related to biophilia. Resistance of cities to external and internal negative phenomena can be achieved through various actions. These include protection of natural ecosystems present within agglomeration, strengthening the bond between society and place of residence, increasing adaptability of the urban environment and the use of nature to prevent negative emotions. An important part of the process of shaping a city that develops in a sustainable way is also building social ties and trust, designing places conducive to creating new relationships, and proper education that puts emphasis on the relationship between man and nature (Beatley, 2016). All these activities relate to bringing nature into the city and shaping a healthy living environment. On the other hand, there are obstacles to making cities more 'natural'. They mainly concern social, cultural, economic or legal problems (Beatley and Newman, 2013).

Browning et al. (2014) attempted to collect and organize and clearly define biophilic patterns. They presented the numerous benefits of designing in line with the idea of biophilia. The presented solutions are directed not only to architects, planners and urban planners, but also to interior architects, employers and developers as well as all people who want to better understand biophilia patterns. The guidelines are based on experience from history, medical sciences or the latest architectural practices, and their creation is the result of detailed and interdisciplinary research. The influence of particular patterns on the human psyche, which affects spheres such as emotions, moods and preferences, productivity and cognitive activities as well as stress and processes related to its re-

duction are also presented. The authors present the genesis of each pattern, explain how it affects perception and well-being, and provide examples of treatments that will allow the application of a given scheme in real space (Browning et al., 2014). Kellert (2018) defines his own rules for designing urban space, while he emphasizes that these are not the only ways to introduce nature into the city. The guidelines presented by the author are not strict guidelines; they are of a general nature. According to Kellert, biophilic design focuses on the adaptability of people in the natural environment, which improves mood and physical and mental health. Kellert and Calabrese (2015) list and describe in detail the experiences and elements that, in his opinion, create a biophilic space, dividing them into 3 groups: direct experience of nature, indirect experience of nature, and experience of space and place (Kellert and Calabrese, 2015). Modrzewski and Szkołut (2014) refer to the thoughts of Fromm, and then Wilson and Kellert. Discussing the benefits of incorporating nature into the immediate surroundings, they focus more on educational and hospital facilities and workplaces than on biophilic city-scale design. They reflect their considerations with scientific examples proving the positive and stimulating impact of nature on the human mind and body (Modrzewski and Szkołut, 2014).

3. CITY PLANNING IN LINE WITH THE IDEA OF BIOPHILIC DESIGN AND THE CONCEPT OF LIVABILITY

The perception of the benefits offered by the presence of nature and the deteriorating state of the environment meant that in the recent years it has increased the importance of ideas such as sustainable development, biophilic design, livability. Eco patterns have become the guidelines for cities that want to expand in harmony with nature and the surrounding landscape, while ensuring a high level of prosperity. Equally important goal was to achieve some kind of resilience to negative phenomena, such as climate change, natural disasters, conflicts and economic problems that are affecting countries around the world (Beatley and Newman, 2013). Designing in accordance with the idea of biophilia increases involvement in natural processes, while at the same time strengthening the diversity manifested in the external environment and landscape. Biophilicity, sustainable development and the mentioned livability are concepts that are connected with each other. Current efforts to create cities greener, with a greater share of nature, will make them more resistant to the adverse effects of the outside world (Beatley and Newman, 2013). Biophilic design provides healthy and productive environment for a modern man in the planning of local communities as active and sociable neighborhoods (Stanković, et al., 2019).

These premises characterize centers belonging to the network of biophilic cities, which was officially established in 2013. Initially, the network had 11 partner cities such as Singapore, Birmingham, San Francisco, Portland, Wellington, Montreal, Milwaukee, Vitoria-Gasteiz, Rio de Janeiro, Phoenix and Oslo. The overall goal of the program is to improve the theory and practice of designing biophilic cities, which can be achieved through research and scientific cooperation. The quality of urban spaces is constantly monitored and evaluated, which will allow recognizing any obstacles preventing the creation of places that will become closer to nature. At the same time, these practices will allow the identification and documentation of best practices in planning and design in line with the assumptions of the biophilia concept. The concept also creates an opportunity for discussion and dialogue between researchers, planners and politicians, and gives the opportunity to share works, reports and publications illustrating its results. Anyone who wants to make their immediate surroundings a place where nature plays the most important role can join the network, and people are encouraged to strengthen their ties with the surrounding nature. Cities wishing to become partners must meet several key requirements. The basic one is the issuing an official statement by the authorities or other act indicating willingness to participate in the program. Membership in the network also obliges future members to define at least five biophilicity determinants that will be monitored on an ongoing basis. These indicators should be selected from categories such as:

- natural conditions, advantages and infrastructure (e.g. percentage of forest cover, population living less than 300 m from green areas, area of green roofs or vertical gardens per 1000 people, share of natural ecosystems in the total area of the city, etc.),

- biophilic involvement, participation, activities and knowledge (e.g. percentage of population visiting green areas, inhabitants' knowledge of local plant and animal species, etc.),
- biophilic institutions, planning and power (e.g. part of the budget for education, developing a strategy or action plan to achieve biophilicity, etc.),
- public health indicators (e.g. percentage of residents spending at least 30 minutes a day in the midst of nature or devoting this time to physical activity outside, number of schools where students have the opportunity to play daily in the natural environment, etc.).

The goal of developing cities in the spirit of loving nature is to appreciate its present and repaired degraded or lost forms, as well as integrate them within emerging projects. A biophilic city is a place that mimics natural systems and refers to them through the nature of buildings and landscapes. This is manifested for example in the architectural forms or design referring to elements of the natural environment, which are also a reference to a given place and its history (Beatley, 2011). The introduction of changes that will allow the city to achieve a biophilic character must be based on intuition and observation and interpretation of existing examples, rather than the template application of strictly accepted principles, because so far no universal pattern of incorporating nature into the living space of residents has been developed. A man whose aesthetic awareness was shaped properly, perceives the environment differently and receives external stimuli, which is why it is so important to properly use the space, both public and private. As demonstrated by studies carried out by Nasar, an American architect and professor of environmental psychology, the basic feature characterizing areas liked by city residents is the presence of nature (Kosmala and Błaszczuk, 2012). A space rich in vegetation, perceived as harmonious, allows to soothe negative emotions, states of tension and stress, as well as calms down or provides positive feelings, primarily visual (Krawczyk and Cybulski, 2010). A well-managed public space is also conducive to strengthening social relations - it encourages people to spend time outside the home, and thus meet other people. Interestingly, the proximity of green areas also contributes to a decrease in crime and aggression, both among people living nearby and other people (Kosmala and Błaszczuk, 2012).

The concept of biophilia assumes the relationship between man and nature, while the concept of livability refers to the needs of man and his participation in social relations. Nevertheless, the concept of livability is based on the premises of ecology and sustainable use of natural resources.

The concept of "livability" is a broad and cross-cutting concept, which presents many different features. The concept of quality of life includes an understanding of the processes of human development, the area of the living space of the individual and the extent to which his internal psychological processes are affected by environmental factors and individual system of values. The concept of quality of life, however, is extremely complex and hardly definable. The existence of a large number of definitions of quality of life is a consequence of the application of overall social or an individual views at the quality of life, but also the diversity of theoretical models and scientific approaches to its study. The terms most commonly used in connection with the quality of life are the well-being, the livability (livability), the quality of the urban environment (urban environmental quality), sustainability, health, satisfaction, happiness, quality of place, the standard of living. Despite the fact that the importance of the concept of quality of life is significantly wide, it refers either to particular attributes of the people themselves, or to the conditions of the environment in which people live, and we can discern two interlinked dimensions of this concept, the psychological and the environmental. In particular, in relation to the conditions of life in a specific location the term of livability or urban livability is quite often used. Livability and quality of places are related to the environment (as an object) from the perspective of a man (Jaszczak, Kristianova, 2018).

The idea of livability bridges a lot of other concepts, it refers to the particular attributes of the place, which may, affecting one another and the activities in other places, meet the fulfilment of the economic, social and cultural needs of the inhabitants, needs to promote their health and well-being, as well as the needs for conservation of natural resources and ecosystem functions (Jaszczak, Kristianova, 2018). The concept of livability and the concept of quality of life are closely linked to the interests and the indicators of economic prosperity, on the other hand, the definition of satisfaction with life and human happiness only through economic and financial categories is insufficient.

The level of social well-being is often a matter of territorial distribution of economic resources. Disparities in economic prosperity and well-being and also disparities in livability may increase between large and small towns, or in rural areas. Large disparities and poverty can generate a deep dissatisfaction, dysfunction, and deterioration in the quality of life for all. Part of this dynamics, however, are the phenomena, when rapid economic development and the growth of large cities poses negative effects — for example, traffic congestion, environmental pollution, the loss of green spaces, and thus threats to the quality of the everyday living environment (Jaszczak, Kristianova, 2018).

4. LIVABILITY, BIOPHILIA AND PERCEPTION OF PUBLIC SPACES IN CITIES - SELECTED CONCEPTS, PROGRAMS, AND PROJECTS

4.1. Walkability and activity

The basic feature of biophilic cities, combining the ideas of livability, is the integration of elements of nature and making them easily accessible to all residents of the city, especially when they walk. Small, intimate forms of greenery should be combined with larger areas, so that together they form the ecological network of the city. A good practice is densification of built up structure and creation of multifunctional urban spaces, which allows preserving and protecting the natural environment, which should be exposed in the city structure. The feeling of nature not only has a positive effect on human health and psyche, but also emphasizes the unique character of the place.

"Walkability" is an idea that explains the relationship between the friendliness of urban space residents and the possibility of walking between individual residential, service, cultural and social points. The purpose of walking is related to health-related, but also ecological, economic and social issues. The structure of the housing estate or a fragment of the city should include the street zone, buildings, but above all parks, green areas, boulevards and valuable natural areas, including forests (Tab.1). The implementation of "walkability" brings a number of benefits, including increasing of street safety, reducing of air pollution and noise, increasing the people's health, increasing the attractiveness of public spaces as friendly places for residents, but also tourists or potential investors, reducing transport and mobility needs (Turoń et al. 2017, Gehl, 2013).

Tab. 1. Space planning capabilities with using of walkability. Source: Own elaboration

Walkability	Urban spaces with "walkability" coverage	Functions and possibilities of sustainable planning	Usage by inhabitants
	Space related to mobility (street and its surroundings)	Incorporating the idea of integrated traffic with speed limit in downtown areas or excluding car traffic from downtown. Planning of safe transportation systems.	Entrances to the center occasionally, only when necessary.
	Space connected with the pavement lane and bicycle path	Planning elements of calm traffic (deflections and narrowing, inclusion in the road lane, pavement lane and bicycle path). Introduction of linear plantings, e.g. in the form of alleys or low plantings along paths.	Possibility of increasing physical activity by residents in the form of walks, runs, bike.
	Woonerfs	Street planning maintaining the transportation function, but increasing the possibility of using it as a promenade, parking space for bicycles, meeting place for residents, commercial space for restaurant gardens.	The possibility of sharing street space allows interaction, implementation of joint activities by residents.
	Boulevards and waterfronts	Connecting boulevards / waterfronts with a system of paths and passages to the built-up urban space – easy access to walking routes. Planning accompanying green areas.	Creating a space for social integration with various functions in the sections between the walking zone (e.g. restaurants and outdoor bars, playgrounds, gym elements).

<p>Green areas (parks, city forests, squares, gardens, sport areas)</p>	<p>Combination of green areas in a communication system in the city. Creating walking, running and cycling routes in open areas such as forests.</p>	<p>Increasing the role of health-related functions related to enabling urban residents to engage in active or passive recreation.</p>
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An important aspect that allows assessing the perception of a given city is a degree of residents' activity in the surrounding space and their level of satisfaction. This applies to both active and passive activities, which can take various forms, from walking, observing animals to organizing larger projects related to contact with nature. The city's task as a habitat for life is to facilitate contact with nature and make it even more pleasant. There are many reasons why it is worth communing with nature. Some of them concern the sphere of interpersonal relations. Facilitated access to the natural environment is conducive to establishing friendships and strengthening social ties. Public spaces full of greenery are a meeting place, but also give you the opportunity to interact (Fig. 1-4).



Fig. 1. Walking – the main activity in the High Line linear park, New York. Source: Photo by K. Kristianova, 2014



Fig. 2. Installations on the boardwalk and traffic calming zone. Św. Marcin Street, Poznań, Poland. Source: Photo by A. Jaszczak



Fig. 3. Jogging activities – running in the greenway of Boston's Emerald Necklace. Source: Photo by K. Kristianova, 2014:



Fig. 4. Outdoor exercise equipment enhancing fitness in public spaces at the Danube embankment in Bratislava. Source: Photo by K. Kristianova, 2010

4.2. Multisensing, smellscape and soundscape

Biophilicity and livability of cities refer to their multisensory nature. The source of external stimuli can be the texture, shape or color of the components of the urban environment (buildings, vegeta-

tion), as well as sounds from the environment. A daily visit to urban forest benefits to the stress reduction and supports a social cohesion of the younger population (Vujičić and Tomičević-Dubljević, 2018).

The forms of greenery create the opportunity to connect with the natural environment, and what's more, they have the therapeutic factor, contrasting with the traditional hustle and bustle. Natural textures and architectural materials make public spaces more interesting, more diverse, which at the same time affect the senses of people. The geo-complex landscape provides a set of signals through stimulation channels, sensual experience and sensory feelings are fundamental in assessing the environment. The landscape is the largest part of the space that can be covered by the senses, which gives considerable research opportunities (Rogowski, 2016).

In the theory of feelings affecting the perception of specific spaces, one can distinguish the perception of city smells, the so-called smellscape or perception of city sounds, so-called soundscape (Fig. 5-6). Smell is very important to how we perceive space, although it is rarely seen as a factor affecting the planning of public spaces. If odor is taken into account at all, planners mainly deal with the management and control of unpleasant odors (Quercia et al., 2015). On the other hand, one should note the fact that it is not used in both scientific research and in the practical side of planning the places that are preferred by residents in terms of pleasant smells. Only a few examples can be given, which use fragrance reception when designing urban fragrance paths, similar to the way cities receive sound.



Fig. 5. Smellscape. Spice market in Marrakech.
Source: Photo by A. Jaszczak



Fig. 6. Soundscape and lights festival in park, Bad Bevensen, Germany. Source: Photo by A. Jaszczak

Soundscape theories are more often considered in the public space planning. At the end of the 1960s, Schafer created The World Soundscape Project (WSP), which initiated the development of the interdisciplinary research direction of sound (acoustic) ecology (Schafer, 1998). This direction is considered in the historical, social and perceptual aspect, the relationships established by man in correlation with the environment by means of sounds (Bernat, 2015). In the course of the development of sound ecology, which was initiated by Schafer, numerous research projects have been created, including Soudscapes from Canada, Vancouver Soundscape in 1974, Five Village Soundscapes in Germany, Scotland, Italy, Sweden and France in 1975-1977. The projects aimed at documenting the relationships between human culture and the acoustic environment at the turn of the information and industrial age. During the research, interviews and surveys were carried out, sound walks, acoustic measurements as well as phonographic recordings of sound signs and landscapes were made. Research groups headed by Schafer gathered a large library of descriptions and recordings of audio landscapes of cities, towns, and suburban areas, parks, coasts, gardens, the sounds of offices and factories, festivals, street music as well as religious ceremonies and ceremonies. The acquired materials became the starting point for conscious acoustic design, aimed at improving the sound environments of the developed areas.

Currently, in conducting research due to the interdisciplinary nature of the audio landscape, about 20 scientific disciplines are involved (sociology, musicology, architecture, psychology, acoustics, communication science, geography, etc.). The representatives operate in accordance with the international movement of acoustic ecology as part of the World Forum for Acoustic Ecology – the International Forum for Sound Ecology. Sound as a variable over time is extremely difficult to develop and visualize. Currently, research into sound landscape uses survey methods, interviews, sound maps, sound walks, mind maps, sound preference tests, and semantic differential (Bernat, 2008, Małkowska, 2018), Tab.2.

Tab. 2. Possibilities of planning urban space in accordance with the principles of multisensory Source: Own elaboration

Multisensing, Soundscape, Smellscape	Public spaces	Function and possibility of sustainable planning	Social perception
	Urban forests, Parks and city green areas, sport and recreational areas	Reduction of urban air pollution, runoff management, different functions, using different forms of planting with specific aromatic or sound-producing properties, creation of special zones with smellscape and soundscape meaning, creating an oasis for fauna, e.g. birds or insects in parks.	Possible reception of natural factors by residents, e.g. in forests and open areas, as well as sound or multisensory elements intentionally introduced into parks and green areas. Joint participation by residents in music festivals in parks or recreational activities, e.g. yoga or yoga with sound.
	Squares	Planning sound barriers using plant compositions separating squares from the loud part of the city, e.g. from streets. Planning of aromatic vegetation to neutralize unpleasant odors.	Including of space for joint social contacts, including places for social and cultural activity on squares. Creation of places for concerts, festivals, artistic shows.
	Communication areas	Introducing solutions to reduce the negative effects of transport (or traffic) pollution. Planning solutions involving the introduction of high vegetation in roadside lines. The use of soundproof barrier solutions to suppress negative communication noises and improvement of air quality.	Reducing the degree of negative reception of transport space through sound insulation.
	Residential zones	Planning housing estate areas by creating garden interiors with various functions and separating them with vegetation with	Well-being of inhabitants (recreation, children's safety, urban gar-

		aromatic properties. Creating social and utility gardens (e.g. vegetable gardens, fruit orchards), roof gardens, gardens on terraces.	dening). Initiatives of housing estate residents related to the use of common areas, courtyards and estate gardens.
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4.3. Nature imitation, green areas and "green therapy"

As Drapella-Hermansdorfer (2008) states, the current state of knowledge and practices in the field of urban design and construction abolishes artificial divisions into the natural and anthropogenic environment. This is connected with the recognition of the city space as a kind of "third nature" (Drapella-Hermansdorfer, 2008). The reference to nature in planning takes place not only by imitating the solutions or materials it provides, but also by reproducing symbols, shapes and forms that often appear e.g. in street names or pedestrian paths, but most often they are used in the design of buildings (Kuznietsova and Osychenko, 2020) or entire districts. Apart from the timelessness and aesthetic value of these elements, they are a direct reference to the world of nature, strengthen the connection between nature and man and constantly remind us of its heritage. References to primary forms, forms recurring in nature, and natural phenomena play a large role in urban space planning.

Another issue is the use of e.g. the aforementioned natural phenomena in the development of new technologies and direct translation into joint or individual space projects. Pro-ecological elements relating to nature base solution are increasingly appearing in contemporary public space development projects. Attention is drawn to the need to introduce "green forms" even where it seems impossible, e.g. in the space of strict downtown buildings or in transport-related zones. For example there are solutions of roof gardens, vertical walls, flower meadows, or rain gardens. All these forms affect the positive perception of space by residents (Tab.3).

Tab.3. Examples of nature based solutions and possibility of their use. Source: Own elaborationn

Nature base solutions	Public and privat spaces	Function and possibility of sustainable planning	Social perception
	Parks and squares	The use of roof-type solutions (in recreational, service and other buildings), vertical walls with vegetation or green curtains, creating micro graduation towers in the space of parks.	The therapeutic significance of typical greenery and nature based solution as a supplement to health and therapeutic functions. Using of sports, recreation and therapeutic programs in parks.
	Pocket spaces/small gardens/micro spaces	Creating rain gardens also small-scale micro gardens where water is stored. Planning of space for active therapy in the form of social gardens.	Ecological and therapeutic significance of rain gardens for residents. Social participation in activities related to care and work in social gardens.
	Cultural/educational/social areas	Similarly as above, it is possible to plan roof gardens or green walls.	Educational task, including the nature base solutions system in the education of children, adolescents and adults.
	Transportation areas	Planning of green walls or roadside embankments with planted vegetation Planning of green bus stops (green roofs). Planning of green roofs on parking spaces.	Better perception of space, properties related to improving the health of residents.

In the era of faster and faster changes in urban space, we need a "green" oasis to rest, relax or improve health. Health and well-being are factors that influence the quality of life, and this quality translates into the degree of development of society (Johnson, 1995, Dave, 2011). The inclusion of

green areas in the structure of cities improves biological and environmental conditions. Increasing attention is paid not only to the natural, landscape or decorative role of parks and gardens, but also to their therapeutic significance. Parks, green spaces and gardens perform biological and decorative functions, but also have a significant impact on the condition of people, which is why they are used in "green therapy" (Fig. 7-8). The therapeutic effect of various forms of greenery is related to the physical condition of a person, as well as his psyche.

What matters is the state of mind, the feeling of "green" space in the metaphysical sense. Properly planned green areas are both a place of rest and contemplation (a state of mind), and also improve concentration, "refresh" the mind, and above all allow you to increase physical fitness. Green areas are an inseparable element of spaces intended for treatment and rehabilitation. They also directly and indirectly affect the well-being and health of its inhabitants through rest, relaxation, therapy and renewal of vitality. The closer is the environment to a human being, the better is the human well-being (El-Barmelgy, 2013).



Fig. 7. Green solutions in Jama Park, Bratislava, Slovakia. Source: Photo by A. Jaszczak

5. CONCLUSION

Planning urban space in recent years has radically changed the direction. Hardly any of today's urban planners dispute the issues raised by alarming experts when it comes to climate change, pollution, overcrowding, changing demographic conditions. Higher environmental quality has become imperative in urban planning, which should be achieved by ecologically responsible behavior

in climate changing conditions (Stupar et al., 2013). Rather, there is a change in attitude to thinking about design from focused only on the needs of residents and the broadly understood consumption of space into thinking about sustainable planning, or more pro-ecological and pro-health planning. The work refers to the biophilic theory and the concept of livability. Only seemingly designing for people and thinking about the benefits of using space by themselves (livability) is far from coexistence with nature (biophilia). Both tendencies intertwine and only such a form that takes into account respect for nature and changes in its structure to a minimal extent can bring the expected effects of positive reception of space by urban residents. The examples of walkability and activity which are given in the article are activities in space, which are assumed to take into account the improvement of the health and condition of residents. Therefore, it would be appropriate for such places to create conditions for activity in built-up spaces shared with existing green areas or natural areas within city borders. It is extremely important in planning to pay attention to multisensory nature and, e.g., suppression of adverse noise and the introduction of sounds of nature or referring to nature (soundscape). The city space can be perceived by the sense of smell, just like in the case of soundscape places, it is also possible to interfere with the project accordingly. Wherever possible, especially in the case of strict development, in the city centers, nature-based solutions should be proposed (e.g. green roofs, green walls, rain gardens, ecological floating islands). Public spaces in cities can also have a therapeutic character. Here, existing parks, green areas, squares, as well as open areas, forests, and aquatic areas play a huge role. Accordingly, it is worth to emphasize once again that the need for a new perspective on urban space planning and relate it primarily to current cultural and environmental hazards.



Fig. 8. Green wall installation in the public park, Istanbul. Source: Photo by A.Jaszczak

ACKNOWLEDGEMENTS

The research was supported by the project APVV SK-PL-18-0022 "LIVA - The Concept of livability in the context of small towns" funded by NAWA – Polish National Agency for Academic Exchange and SRDA - Slovak Research and Development Agency. The authors would like to acknowledge networking support by the COST Action CA13177 Circular City - Implementing nature based solutions for creating a resourceful circular city.

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