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DESIGNING OF OUTDOOR GREEN RECREATIONAL PARKS

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Abstract
The lack of «green» from the urban environment has negative effects on all aspects of human activity. People are affected psychologically, spiritually, culturally and also in their work life, under constant pressure and high stress levels, deprived of important activities and the pleasures of everyday life. Thus, it is observed that people tend to prefer natural landscapes than structured ones, especially when there is an absence of vegetation and aquatic element. Generally, when people are under pressure, they search for the shelter of a natural landscape, that will make them feel better. Landscapes consisting of trees, grass, water, rock formations, flowers and birds are considered very useful and necessary in today's busy city people. This paper records the most important principles, which are useful to follow when designing an outdoor urban recreation area.
Keywords: recreation; outdoor; parks; urban; green

1. INTRODUCTION

The function and use of «green resources» should be such, as not to limit communal and easy access of the population, not to disturb the structure of the flora and fauna in general, and not to affect the aesthetics, culture and the environment. So, the roles of suburban green areas are: a) Daily recreation, b) Stabilization of soils and flood protection of urban areas, c) Specific forms of exercising (walking, light jogging, hiking, climbing, etc.), d) Contact with the natural environment and environmental education, e) Contribution to improving the climate, f) Clarity of the atmosphere, g) Direct and indirect economic benefits.

Hunting, car racing and motocross, which cause noises, disturb recreational activities and wildlife, as well as any other activity that limits the public use (Eleftheriadis 2002), should be considered incompatible use of suburban forests. Thus, the following conclusions can be drawn about the role of urban and suburban green areas (Ntafis 2001): a) The possibility to offer short-term and frequent leisure, b) Offering better climatic living conditions for the city's residents. The phenomenon of city overheating and the creation of an urban heat island, that raises the temperature in the city by 6-10oC, can only be alleviated or even reversed by sufficient green areas, c) Protection against the wind, d) Noise Reduction, e) Conservation of atmosphere's composition, f) Stabilization of soils and flood protection, g) Provision of natural

environment for the local fauna. The purpose of this paper is to examine and present the evolution in the design of outdoor green recreational parks.

2. The role of «green»

Below, a more detailed presentation of the benefits of urban «green resources» is presented:

a) Reduction of air pollution

«Green» (especially trees) is necessary because it helps in capturing and retaining solid pollutants (dust, ashes, smoke, pollen) and produces oxygen. During photosynthesis, which is the most important biological phenomenon, trees, with the help mainly of chlorophyll, under sunlight and moisture, absorb CO2 from the atmosphere, retaining carbon, and emit oxygen and ozone. If you calculate that a person consumes 250 pounds of O2 per year, then one hectare (10 acres) of forest ensures breathing for 10 people, producing 2.5 tons / hectare. Studies have shown that 25 to 30 plants produce the amount of oxygen needed for about two people to breath. Also it absorbs enough CO2 per hectare annually, so that it balances the amount produced by a car driver traveling a distance of 41,600 kilometers. According to a survey conducted in Chicago in 1991, the air pollution control of an urban forest of 2,100 hectares, was equivalent to implementing technical measures for limiting the pollution, costing $ 136 per day (McPherson, 1991). In another study, it was estimated that the reduction of pollutants by urban forests provided important benefits, which ranged from 8 million USD in Milwaukee to 30 million USD in Austin, at an annual base (American Forests 1997).

b) Addressing greenhouse effect

Heat radiated from the earth's surface is trapped in the atmosphere, due to the high levels of CO2 and other gases, thus it is prevented from being released in space and as a result it leads to the well-known «greenhouse effect». Trees function as carbon absorbers, as they isolate it from CO2 and store it in their celled tissue, the trunk, while releasing O2 back to the atmosphere. One hectare of healthy trees stores about 2.6 tons of carbon each year. Also, trees reduce the greenhouse effect by shading the city blocks and office buildings. This reduces the need for air conditioning by 30%, thus decreasing the amount of fossil fuels consumed to generate electricity or other forms of energy. The combination of CO2 absorption from the atmosphere, by storing it in the trunks, and temperature lowering, makes trees effective tools in combating the greenhouse effect.

c) Saving water and preventing soil erosion

Trees indirectly create an organic material on the surface of fallen leaves, while their roots increase soil permeability leading to the following results. Firstly, by reducing water flow in the earth's surface after

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periods of intense rains, storms, etc. Also, by reducing soil erosion and preventing flooding, increasing underground water reserves, reducing the amount of chemical components in the soil entrained by water currents and finally, reducing the amount of soil carried away by the wind. Without the existence of trees in the cities, it would be required to increase the drains and drainage channels (runoff) to restrain impetuous water, resulting to an increase in manufacturing costs and to an expansion of sewerage projects. In a study conducted in the USA, it was calculated the protection of soil from erosion, due to forests, contributes at national level by saving 400 billion USD (American Forests 1997).

d) Energy Saving

The rational design and proper placement of trees in urban areas is as effective as other energy saving techniques, such as insulation and double glazing. Trees help to reduce heating and cooling costs. During the summer months, they provide coolness, while during the cold months they provide a natural windbreak, thus less fuel and electricity, for heating and cooling purposes, is required. At least three trees, properly placed around the house, provide shade and reduce air conditioning costs by 30%. Trees that provide shade give better results when: 1) they are deciduous, meaning that they shed their leaves in winter and provide shade during summer, allowing sunlight to reach the house in the cold months when they no longer have foliage, 2) are planted on the south and west sides of the space environment and 3) shade hard surfaces such as roads, courtyards, sidewalks, terraces to minimize heat loading of the landscape. This study examines the right choice of plant species and planting, in order to maximize energy savings.

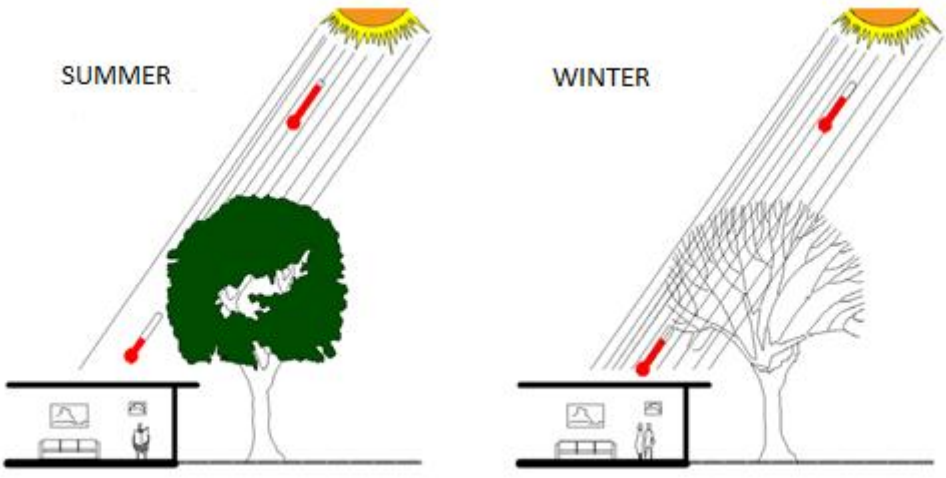

FIGURE 1 - DECIDUOUS TREES IN SUMMER AND WINTER (SOURCE: KOLIOTSAS 2008).

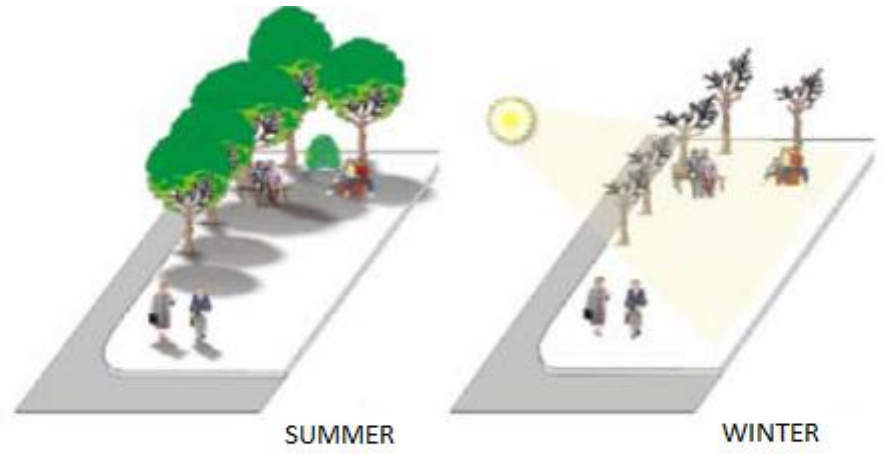

FIGURE 2 - EXAMINING SHADING AND INSOLATION AT PLANTING SITES (SOURCE: CHRYSOMALLIDOU, THEODOSIOU, & TSIKALOUDAKI 2002).

e) Effect on local climate

Trees help reducing the maximum temperature in the city center, which has increased due to the «urban heat island» phenomenon. Urban heat islands are created by the accumulation of heat in the cement, in steel and asphalt, which are 3-100 times hotter than the area that surrounds them. Plants in urban areas reduce the air temperature through evaporation. So, trees provide additional benefits, because they reduce the air's temperature due to shading, increase the moisture in dry climates through evaporation, reduce glare on sunny days and reduce the wind's speed. It is reported by the Interdisciplinary Institute for Environmental Research (D.I.P.E.) that the internal temperature of buildings is reduced from 15% to 50%, by planting deciduous trees on terraces, gardens, sidewalks, etc.

TABLE 1 - SUMMARIZE OF THE CHANGE IN CLIMATE DATA DUE TO URBANIZATION.

Climate data		***Comparison with rural area***
Pollutants	Particulates	10 times more
	Gaseous ingredients	5-25 times more
Nebulosity	Cloud cover	5-10% more
	Fog in winter	100% more
	Fog in summer	30% more
Relative humidity	Winter	2% less
	Summer	8% less
Radiation	Total	15-20% less
	Ultraviolet	5-30% less
	Sunshine duration	5-15% less
Temperature	Average annual	0,5-1 °C more
	Average minimum	1-2 °C more
Wind speed	Average annual	20-30% less
	Strong winds	10-20% less
	Lull	5-10% more

(Source: Kartallis 1999)

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f) Increasing economic stability

The existence and condition of groves of urban trees is usually the first impression that a community makes to its visitors. Studies have shown that trees enhance economic stability in the community by attracting visitors and businesses. People stroll and shop more along tree-lined streets. Apartments and offices in areas with trees are rented more easily at higher rents, while their tenants stay longer and companies that rent office spaces in areas with trees (woody) found that workers are more productive and they take less leaves especially during summer.

g) Creation of wildlife diversity

Trees and plants create local ecosystems that provide shelter and food for birds and other animals. The heterogeneity and diversity of living beings is an important part of urban green.

h) Environmental education

Urban green mainly encourages experiential learning and active participation of preschool and primary school children in environmental education programs. At this age, children are very interested in elements and phenomena of nature. One of the first definitions of Environmental Education is given by the International Union for the Conservation of Nature (1970): «Environmental Education is the recognition of the value and the clarification of concepts in order to develop skills and attitudes that are necessary for the understanding and appreciation of human interrelation, culture and biophysical environment. It requires practical involvement in decision making and the formulation of a code of conduct for matters that are related to the environment's quality». As vegetation grows and satisfies the senses, it provides numerous visual (shape, color, texture), tactile, audio, osmatic, cognitive and affective stimuli, which are of exceptional educational value. It also attracts the children's attention and imagination and enhances creative collaboration and expression through play. As a result, children acquire diverse and enjoyable experiences and develop «environmental ethics», which are extremely significant for the protection of nature by humans and especially children.

i) Noise Reduction

Planting trees along roads reduces the increased noise level caused by traffic by 20-25 dB. Surveys have shown that this reduction is proportional to the planting density. Studies of noise intensity in three different districts of a city with different structures and methods to achieve noise reduction, using plant «shields» with distinct layouts, showed that planting trees in a neighborhood reduces noise intensity by 4-6 times, traffic noise is reduced when acoustic waves are filtered by green belts, the existence of bushes between tall trees with wide leaves leads to improved results and random placement of trees has the biggest impact on reducing noise.

FIGURE 3 - EXAMPLE OF REVERBERANT FENCE (SOURCE: CHRYSOMALLIDOU ET AL. 2002).

j) Provision of daily or «few hour» recreation

The term «few hour recreation» is defined as leisure, whose main aim is relaxation and escaping from the intense city rhythms. This type of recreation does not require extensive prior organization and lacks any competitive element. The only thing that is required is a natural environment providing pleasure, tranquility and fresh air. Activities that can take place during this type of recreation are visiting green areas for picnics, outdoor games, walking, enjoying landscapes and gaining information about natural history.

k) Plants and ionization of air

Air ionization is another important element of the microclimate and the contribution of green areas is pivotal. Beyond gases and water vapor molecules, air contains an amount of ions, positively or negatively electrified particles. Many researches have been conducted, in order to identify the effect of air ionization on the human body. Many researchers believe that negative ions lead to better oxygen intake and strengthen the immune system. Apart from this, the presence of negative ions helps boosting the metabolism. Plants are negatively charged, thereby attracting positive ions. Air ionization above green surfaces is quite increased, while the ionization of oxygen, which is an important process for life itself, is significant. Surveys have shown that, production of negative ions differs amongst plants. A classification of plants, based on their share of air ionization, is presented at the following table II (Anastasijevic 1987).

TABLE 2 - RATES OF PARTICIPATION OF THE PLANTS IN AIR IONIZATION.

Species	Percentage of share of air ionization (%)
Pinus silvestris	80
Betula nana	64
Sorbus aucuparia	49
Quercus rubra	35
Thuja occidentalis	28
Crataegus oxycantha	12
Tilia parvifolia	8

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I) The bactericidal action of plants

Since 1928 pants are proven to release substances, which have bactericidal abilities, in the air. Some of these substances are sustained in the air, while some others settle. The functionality of plants is twofold: they destroy bacteria and also they stop their growth. It is therefore clear that some plants are of paramount importance, especially when it comes to green areas around hospitals and generally areas where hygienic conditions must be ensured. Polar, birch, walnut and laurel are among the plants with the greatest bactericidal action.

3. Outdoor areas - Urban areas - Urban parks

The definition of the Council of Europe (1986) for outdoor areas refers to their most important characteristics and points out their role in the city. Specifically, it states that: Outdoor areas are a key part of urban heritage, structural element of the aesthetic and architectural form of a city, while they also play an important educational role and are ecologically remarkable. In addition, they are important for social interaction and enhancement of social development and support economic goals and activities. More specifically, they help reducing tensions and conflicts in deprived urban areas in Europe. Their role is crucial in contributing to the recreational and leisure needs of society.

The main elements of a natural environment are plant species such as trees, shrubs, flowers and turf, namely the well-known «green», which are required by both cities and residents, in order to change their image or their mood accordingly. Urban green refers to all trees, shrubs and other plants (annual or seasonal), which exist in the city and constitute parks, groves, rows of trees, streams, building blocks' outdoor spaces, flowerbeds and surroundings of school premises, hospitals, public buildings, museums, churches, playgrounds, etc. (Ntafis 2001).

A city park, in the current era and in big cities, must first provide an escape from the human, unnatural, densely built environment to an area with different colors, shapes, sounds and aesthetics, with cleaner air and milder noises. An area, which is cool and shady, sunny or simple, with sky and panoramic views. In other words, a place that offers various elements of nature that built space does not. Consequently, an urban park should mimic nature, including woods, scrubs, individual trees, meadows, lakes, streams, rocks, caves, etc., by matching natural elements with gardening configurations (e.g., grass matches with meadow, rock gardens match with rocky natural areas, etc.). Imitation is not an easy task and for this reason the best parks in the world are those who succeed in it. The yards of French schools, with the hard geometry and strict symmetry, have been rejected, while the yards of English schools, that best achieve the imitation of nature, have dominated as they serve the recreational function optimally.

A park is not a place of unspoiled nature. Instead, it is an accessible area for visitors of various social layers and population ages, so it should have the corresponding infrastructure for their needs. This infrastructure must not disrupt or degrade the natural elements, which are not the dominant element of the park, and are not the objective per se (Eleftheriadis 2002). The dominant mode of urbanization in our contemporary world is characterized by large scale urban renewal projects, which are deployed with little or no consideration given to social predicaments. Critical reflections on urban issues can now be incorporated into design works (Batuman & Baykan 2014).

Indicators and standards have been adopted as the conceptual foundation of contemporary park and outdoor recreation planning and management frameworks, including limits of acceptable interference, visitor impact management and visitor experience, as well as resources protection. All these frameworks function through a core sequence of steps: (1) formulate management objectives/desired conditions and associated indicators and standards, (2) monitor indicator variables, and (3) apply management practices to ensure that standards are maintained. As a result, carrying capacity is defined and parks and outdoor recreation areas are managed in a way that sustains park resources and ensures the quality of the visitors' experience (Budruk & Phillips 2010).

Recreation activities at the city's parks are usually intra-day and recurrent. Consequently, urban greenery must have sufficient space and proper dispersion in the residential area, so that it is accessible anytime by the entire population. In small settlements (e.g. villages), urban green is perhaps not directly necessary. Their residents may encounter natural environments, such as forests, or even semi-natural environments, such as fields, just outside the settlement boundaries. The larger the settlement, or the residential area of a large city, the greater the green area needed. The 2 sq.m. of green per resident in structured Athens is grossly inadequate. Most European cities have a much higher percentage (London, Paris) and new cities are designed to provide 30 to 35 sq.m. of green per resident.

The purpose of an urban green space, as well as its size and definition are issues that emerged in recent years and have not received proper attention and analysis by the state, so there is no foundation to develop a serious green policy upon. To make matters worse, the lack of a clear separation between green spaces and outdoor communal spaces, the low rates of green spaces per capita, compared to European standards, and the modification of land coverage rate, have worsened the situation and have stretched it to its limits. Today «green» is perceived as the remainder of an urban setting.

«Green» and its beneficial effects, which have been reported in previous paragraphs, is an issue that deserves attention from local authorities, as well as the central government, as the current situation poses a danger, because of the inadequate percentage of green in the cities. Stress is a severe mortality factor (Rainford et al. 2000) for the people who live in modern, industrialized societies, thereby the cost of

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treatment is significantly increased in these countries and worsers' productive hours are lost. A report from the Health Service of the United Kingdom (U.K.D.H. 2004) notes that «physical activity helps people feel better, as it improves mood and simultaneously reduces anxiety, increases their self-esteem, reduces stress reactions and finally helps them to sleep better». Parks, trails in the city and other green spaces enable an active lifestyle and prevent obesity and sudden deaths (Frank & Engelke 2001; Maller et al. 2006; Coen & Ross 2006; Reynolds et. al. 2007). As physical activity has a positive effect on both the physical and the psychological condition of people (Scully et al. 1998), it is important to note that there is an additional benefit when this physical activity is performed in a natural environment (Hayashi et al. 1999). This process is defined by Pretty and his colleagues (2003) as «green exercise». However, little attention has been paid to the benefits for people's mental health. Limited natural environment entails poorer mental health and greater inability to reduce the negative effects of stress (Pretty et. al. 2004).

Suburban «green» aims at limiting the spread of the cities and, in some cases, preserving their particular character. In suburban «green» areas certain developmental activities, other than these which aim at better achieving the purpose of recreation, namely sports and other recreational facilities, are not allowed. Green zones around urban centers act as a buffer for the overall balance of the environment in the region. The importance of some of the following factors: infrastructure, soil, climate, vegetation, exercise, users, residents and environmental awareness, is proven by specialized in the field scientists (Ntafis 2001; Dober 2000; Pretty 2006). Specifically, Ntafis (2001) argues that when we plan outdoor areas, the natural conditions of the area (climate, vegetation zone) should be considered and forest species, ecologically adapted to the area, should be utilized. Dober (2000) believes that the existence of adequate infrastructure (walking paths, sculptures, benches, presence of water surfaces, etc.) in the exterior of educational institutions plays a significant role in facilitating the needs of users (teachers, students and others). This is with accordance to Forsyth (2015) who identified the importance of walkable places, that provide a holistic solution to urban problems. Pretty (2004) shows that exercising in a pleasant natural environment has more positive effects on the person's blood pressure compared to exercising in an artificial landscape, characterized by the absence of vegetation.

4. The role of urban green and parks

The role of large urban centers in social, economic and cultural life is constantly changing over time. In 1800, London was the only city in the world with a population of one million people, while the 100 largest cities, overall, had a population of 20 million people. The population explosion of the last 100 years is unprecedented in human history. In 1900 only 14% of the world population lived in cities. By 1990, the 100 largest cities in the world had a total population of about 540 million people and 220 million of them lived solely in the 20 largest cities. In the beginning of the 21st century, 47.5% of the world's population,

are residents of cities. By 2025 it is expected that half of the world's population will reside in cities. The following table III shows the evolution of urban population rates in the world (years 1975-2025).

TABLE 3 - URBAN POPULATION RATES.

Area	*1975*	*2000*	*2005*
Worldwide	37,7	47,2	61
More developed regions	69,8	76,2	84
Less developed regions	26,6	40,6	57
Africa	25	37,3	53,8
Asia	24,6	37,6	54,8
Europe	67	75,1	83,2
North America	73,8	77,4	84,7
South America	61,3	76,6	84,6
Oceania	71,7	70,2	74,8

Source: www.minen.gr

In Greece, according to data from the latest census, the majority of the population (over 60%) resides in large urban centers. Based on the above, it is evident that the quality of urban environments is a critical issue on a national and global level. The expansion of large urban centers, combined with urban sprawl in recent decades, have led to a dramatic reduction of the natural environment, especially the cities' green spaces, worsening their inhabitants' quality of life. «Green» and outdoor spaces are not just a decorative element in a city, but living spaces and essential factors for sustainable development. Thus, green and outdoor spaces should play a major part in the design process and spatial organization of a modern city. The types of urban green spaces encountered in modern cities are (Kartallis 1999): a) National parks, b) Plant nurseries, c) Municipal parks and gardens, d) Trees, e) Botanic Gardens, f) Sports fields, g) Zoos, h) Cemeteries, i) Wildlife zones, j) Roads' curbs, k) Urban Forests, l) Courtyards, m) Channels, n) Campuses and o) Plantations. The distribution of green spaces is another big issue, because they tend to be fragmented, unevenly distributed within the urban zone and environmentally degraded, so they cannot stimulate the environmental sensitivities and requirements of the residents. Therefore, increasing the amount of urban outdoor spaces should be a priority for a «sustainable city». Cognitive anthropocentric measures, measuring accessibility and attraction, can change the public opinion about open spaces and «green», which are not a static but a dynamic urban entity (Ståhle 2010).

Within the context of a modern city's features, «green» and free spaces available to residents, do not solely have an ornamental character, but play a number of vital roles and functions with major environmental benefits (Dafis 2001), such as a) Limitation of atmospheric pollution, b) Influence on the microclimate, c) Anti-dust, d) Partial neutralization of noise, e) Wind protection, f) Soil containment, g) Enrichment of groundwater table and h) Protection of biodiversity. And consequently, there are social benefits, such as health, work, training, recreation, increase of the value of properties and production of goods.

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5. Ratio of «green» per city's resident

Despite the fact that green spaces in urban centers bring enormous benefits, they are few in numbers and do not usually meet the requirements of modern societies. This is mainly due to residential policies and lack of sensitivity towards «green» (e.g. creation of free green spaces). Thus, major cities in Greece have the lowest m2 of green areas per capita compared to other European cities. The gap between the desired and the current situation becomes larger when it comes to cities with large numbers of residents (more than 25000-30000). This means that the need of large cities for green spaces is proportionately greater compared to the smaller ones. As mentioned above, in large, modern cities, the requirements in terms of outdoor areas are particularly high for the neutralization of noises. For this reason, and despite the difficulty in acquiring the required surfaces, standards are proposed, discussed and institutionalized constantly. These standards are based on empirical methods and calculate the required surfaces for green spaces, which vary from country to country and from period to period. In the US, for example, the National Recreation and Parks Association has come up with a formulation of the required outdoor spaces and with standards specifying their size. Each state modifies these standards depending on its particular physical, geographical, cultural and demographic characteristics.

In Europe, the cities which experienced population growth after the 2nd World War present an inadequacy of outdoor green spaces. A typical example is Paris, where in the 50s the green ratio was 1.5 m2 per capita, while its Regulatory Plan of 1960 required 2.25 m2 of green spaces per capita. There are, of course, cities where the population growth was accompanied by an increase in green spaces. For instance, Moscow, where the ratio of 15 m2 / capita increased in the 60s to 20 m2 / capita, while in Sofia the ratio of 18 m2 / capita raised to 22 m2 / capita in 1980. Indicative green ratios in various European cities are presented below.

TABLE 4 - RATIO OF GREEN PER RESIDENT.

Cities	m^2 green per resident
Vienna	20.00 m^2
Zurich	10.00 m^2
Hague	27.70 m^2
Amsterdam	27.00 m^2
Berlin	13.00 m^2
Rome	9.00 m^2
Paris	8.54 m^2
Washington	50.00 m^2
Vienna	35.00 m^2
Rotterdam	28.00 m^2
Warsaw	18.00 m^2
London	9.00 m^2

Source: www.minen.gr (2008)

Greek cities face significant shortages of outdoor spaces. In Attica, for example, «residencies» and «transport networks» cover 74.8% of the urban area, while free spaces are limited to 3.6%. In absolute numbers, modern Athens has the smallest percentage of «green» compared to all European cities. Just 2.0 m2 per capita, while the minimum required area for «humane conditions», according to the World Health Organization, is at least 9 m2. Thessaloniki (2nd largest city in Greece) respectively has 2.7 m2 per capita – including Seich Sou forest, which is located near the city, next to Touba, Panorama, St. Paul and Sykies.

Experts on regional planning issues in urban centers have specified the following standards for green areas for playgrounds 1.0 m2 per capita, for public gardens and parks 4.5 m2 per capita and for groves and forests 10.0 m2 per capita. In total, 15.5 m2 of green space per capita. The Ministry of Environment in Greece, according to the Law. 1337/83 and to the Operation for Urban Reconstruction, drafted specifications and standards. The proposed ratio of green spaces is about 7-9.5 m2 / capita, depending on the area's population. Smaller values refer to settlements (up to 3,000 residents), while the standard for cities of more than 300,000 residents is 9.5 m2 / capita. In order for vegetation to have an effective influence on a city's energy balance, a ratio of well distributed green, 15 to 20 m2 / capita, is required (Ntafis 2001).

6. CONCLUSIONS

The vegetation species planted in a park must be ecologically adapted to the region. In addition, depending on their characteristics, they should be planted accordingly, in order to offer the maximum functional and aesthetic benefits (shading, reducing wind intensity, isolation, beautiful colors, etc.). The vegetation types, which are used for creating parks, are of prime importance. Twenty two key principles emerged from this research and should be taken into consideration in the design of outdoor recreation parks. Creation and appropriate placement of thematic parks, in order to achieve functional, aesthetic and environmental goals (entrance of solar rays during winter months, reducing the effects of winds, preservation of natural elements in the area, having different colors, etc.). Design according to the users' needs with the cooperation of experts, such as landscape architects, planners, physical education teachers, etc. Design which takes into account future situations and needs. Design which serves all users, especially people with disabilities. Improvement of microclimate and biodiversity conservation. Creation of activity and rest areas. Usage of plants that satisfy the senses. Usage of friendly and safe materials for humans. Selection of trees whose shape reduces the scale of their surroundings. The vegetation must be uniform, including a variety of plant species. Presence of water surfaces. Creation of walking paths using appropriate materials. Existence of places to eat, relax, communicate and generally to come in «contact». Coverage with lawn areas. Existence of botanical gardens and areas for environmental education.

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Passageways for pedestrians that are connected and create the feeling of safety. Creation of car parking spaces at appropriate locations. Usage of plant species which have historical or other value. Management of the park as a wildlife area. Existence of natural sounds. Creation of various elevation levels. Existence of an information system that provides information about the park.

The presence of an orientation map, which includes all the surrounding facilities, helps people to navigate in a pleasant and efficient way, creating a positive image of the park. All the presented activities' images should be clear and easily understood. Nowadays, technology combines behavior mapping and geographic information system (GIS) techniques. GIS is a tool that is currently irreplaceable in spatial analysis and planning processes for urban areas. It is a detailed analytical and visualization tool that helps to describe the inner structure of places revealed by behavioral patterns (Marušić 2011). The field of parks and outdoor recreation may be a leader in the future of environmental management more broadly.

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