Urban Green Spaces as a Component of an Ecosystem

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Abstract

This chapter is aimed at analyzing a review of the empirical literature on some important features of urban green spaces such as the components, functions, services, community involvement, initiatives, and actions from an ecosystem perspective. The analysis begins from the assumption that urban green spaces are ecosystems of vital importance in enhancing the quality of life in an urban

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environment and supplying ecosystem services, such as biodiversity, climate regulation. Thus, the urban green space ecosystem is an important component of an ecosystem in any community development. Meeting the needs of users is related to the functions and services that urban green spaces provide to communities. Community involvement, engagement, and development require a methodology to ensure that the needs and aspirations of local users in the community are met. The methods employed in this analysis are a review of the empirical literature and documents, analysis of existing data on uses and users, interviews with authorities, and a more detailed examination of case-specific data. Also, as concluding remarks, some of the wider environmental, economic and social initiatives for local authorities and communities are suggested that might justify any funding for the all the stakeholders that are represented and involved. Finally, the chapter proposes some of the opportunities, challenges, and further research.

Keywords
Community involvement · Ecosystem · Functions · Services · Urban green spaces · Users

Introduction

The history of life on earth is one of the living things surrounded by a natural environment that supplies water, fresh air, minerals, plants, vegetation, animals, and all the fruits of nature, etc., for enjoyment of everyday life. However, these natural and environmental resources are not lasting forever, most of them are either polluted and corrupted or extinguished by consumption. Urban populations are facing ecologically vital threats from over-urbanization, such as water and air pollution, agricultural and forest lands with vegetation removal and ground water overdraft. The ecological dimension of urban green spaces considers the objective and subjective components of a place providing a supportive habitat of biological diversity.

The renewal and increasing of urban green spaces considering the fast demographic growth and agglomeration should be accompanied by inhabitants' participation in environmental, social, cultural and economic actions, and objectives to promote the bio-economy in urban biodiversity and sustainable development. Inhabitants should be informed and motivated to participate in environmental, cultural, and educational activities and become active in the designing and planning of urban green spaces. Public support and political involvement of citizens for urban green space development requires various actions. Public urban green spaces are accessible to and used by all the citizens. Arrangements of public activities and actions on planned urban green spaces raise awareness amongst inhabitants of the city. For example, a public event can have the purpose of making users aware and educating them through experiencing and enjoying different activities organized by the urban green space.

In 2014, as many as 54% of the world's population were living in urban settings and this is projected to reach 70% by 2050 (United Nations Department of Economic

and Social Affairs – Population Division 2014) By 2020, around 62% of world's population will live in urban areas, covering 2% of the world's land space and consuming 75% of natural resources. By 2030, two thirds of the urban area that will exist will have to have been built in sustainable urban environments.

In 1953, the seminal report on Park Life recognized urban green spaces as a vital component of urban environment and their role in social renewal (Comedia and Demos 1995). The Urban Parks Programme was launched by the Heritage Lottery Fund and marked the change in attitude toward creating policy initiatives such as the Urban White Paper (Department of the Environment 1996).

Components of Urban Green Spaces

An urban green space system is an important component in any community development, in housing, business, leisure areas, etc. (Baycan-Levent 2002). Components of urban green areas are vegetation, water, accessibility, services of shelters, toilets, seating, playgrounds and sport areas, events and activities, environmental quality conditions and resources such as lighting, safety, litter bins, friendly staff, artistic features and artefacts such as sculptures, etc. The quality assessment of green spaces is measured by factors such as infrastructure, vegetation, accessibility, security, and equipment. Conditions that favor the use of urban green spaces are the distance walking time (Herzele and Wiedeman 2003), location and distribution, easy access, and proximity. Environmental enhancement makes better and more attractive urban green spaces by promoting inward investments, increasing the land value, and stimulating the economy of the community.

Urban green spaces are urban areas that were natural or semi-natural ecosystems that were converted into urban spaces by human influence (Bilgili and Gökyer 2012). Urban green spaces are public and private open spaces in urban areas primarily covered by vegetation, which inspire active or passive recreational and sports activities or have an indirectly positive influence on the urban environment available for the users (Tuzin et al. 2002). Urban green spaces provide sustainable, diverse places where, according to the classic report Park Life "people will find a sense of continuity, of relief from the pressure of urban living, places to be in touch with the natural cycle of the seasons and of wildlife and also places to meet and celebrate with others" (Comedia and Demos 1995).

The mixed community green space is defined as the mix of overall community-level green spaces that significantly affect land surface temperature. However, there is inequitable distribution of heat and thermal discomfort (Huang et al. 2011). Inequitable distributions of community green space are related to socioeconomic status. There are no health impacts documented on the thermal comfort provided by green spaces. A mixed neighborhood green space is a mixed area of grass, trees, and vegetation.

Urban green spaces have different forms and types of open spaces, community parks and gardens, and landscaped areas. Some types of urban green spaces are formal green space, informal green space, natural green space, children's space,

public participation, active sports space, recreation activities, and further land management policies. Urban green spaces exist in a variety of types, structures, and shapes. Urban green spaces include public parks, reserves, sports fields, streams, river banks and other riparian areas, greenways, walkways and trails, communal shared gardens, street trees and bushes, nature conservation areas, and less conventional spaces such as green walls, green alleyways, and cemeteries (Roy et al. 2012).

The broader notion of green space connotes turf grass-related residential, commercial and institutional surfaces and public facilities such as parks and playing fields. Turf grass is associated with the notion of green space that connotes turf-related surfaces as residential, commercial and institutional lawns and turf surfaces.

Urban green spaces connect the urban and the natural, while caring for the environment, social, and economic elements. Public forests and green roofs in public and community buildings, and vacant and derelict land also provide ecosystem services. Productive land use ensures a long-term regeneration initiative to use green spaces properly for economic revenue by implementing sustainable urban initiatives such as drainage schemes. Green spaces include wilder, woodland-type, and untamed elements, with more areas for child development.

An urban green space can be considered a continuum without fences, hierarchies and horizontally maintained at the same level of community-oriented service and a use-oriented approach. Green spaces are the spirit of the community. Urban green spaces are a focal point for communities (Greenspace 2007). Urban green spaces contribute to building a sense of community among residents who are more likely to enjoy strong social ties. Green spaces promote interaction between people, developing social ties and community cohesion. Greenness in a neighborhood is one of the most important predictors of neighborhood satisfaction (Van Herzele and de Vries 2011).

Ecosystems, Functions, and Services of Urban Green Spaces

Urban green spaces are ecosystems of vital importance in enhancing the quality of life in an urban environment. Urban green spaces supply ecosystem services such as biodiversity and climate regulation. Urban green spaces are essential for the quality of life, health, and well-being of citizens. Urban green spaces are critical for protecting wildlife, watersheds, meads, vegetation, providing air quality for a dense urban environment and recreational activities. Cool islands in dense urban areas can be provided between green spaces. A dense green space is more effective at preventing nitrogen run-off, untreated human and industrial waste, toxic materials, and debris. Urban green spaces provide ecosystem services that can improve the conditions of the environment, pollution, and congestion of the large metropolitan area of Guadalajara.

Green spatial connectivity and density are associated with the cooling and pollution-mitigating capacity of the diversity of urban green space types and connected green path corridors. Green space density is described as the tree canopy cover (Feyisa et al. 2014), the relative percentage of vegetation (Ng et al. 2012). The

cover patterns, densities, and balance of green spaces affect the urban heat island (Dobrovolný 2013; Kong et al. 2014; Li et al. 2011). The density and size of the green space are highly interrelated and multi-scale, dependent on configuration. Greener spaces are cooler than non-green spaces and contribute to lower ambient temperatures (Srivanit and Hokao 2013).

There is a significant association between the increased density and cooling effects of greenspaces (Dobrovolný 2013; Feyisa et al. 2014; Hart and Sailor 2009; Ng et al. 2012; Perini and Magliocco 2014; Vidrih and Medved 2013; Weber et al. 2014; Zhang et al. 2013). The cooling range of green spaces into surroundings is influenced by the building density, arrangements and heights (Li et al. 2012, 2013; Zoulia et al. 2009). Urban greening density is suggested to become optimal at $\geq$50% coverage (Ng et al. 2012). Urban greening initiatives are insufficient for achieving air quality and climate. Greening reduces heat stress and related illnesses (Bassil et al. 2010).

The reasons for visiting urban green spaces are mostly to enjoy a wide range of environmental elements such as flowers, trees, nature, fresh air, wildlife, watching cascades, educational opportunities, social activities, taking children to play, social interaction, to meet friends, picnics, meeting people, getting away from it all, passive walking and activities, shelter and sitting, etc. Shared parks and gardens may be set up to facilitate social links, collective participatory projects and collective cultural interventions, well-being recreational areas and walkways connecting attractions and facilities.

Other reasons why people visit urban green spaces are to walk a dog, walk by the lake, river or creek, walk socially as part of a group, hanging out, passive enjoyment, sitting either on the grass or on seats, photography, messing about on swings, watching sport, reading, watching life go, smoking, sunbathing, an informal pursuit such as flying kites, fishing, etc. Walkable green spaces in urban areas are associated with a healthy environment and increasing green exercise. Walkable green spaces influence the longevity of urban senior citizens (Wolf 2010).

Urban green spaces have beneficial physical, psychological, and health effects through physical activities and green exercises. Environmental determinants affect the use of green spaces, physical activities, and leisure. The amount of green spaces available to users in the living environment correlates with socioeconomic, demographic, and self-perceived health. Higher levels of greenness have been positively associated with lower stroke mortality. Perceived neighborhood greenness is positively associated with physical and mental health. Socioeconomic and cross-cultural variations may result from the unequal distribution of green spaces.

Another important reason to visit urban green spaces is the use of facilities such as cafes, restaurants, environmental centers, libraries, museums, sports such as football, tennis, etc., biking, skateboarding, cycling, and other forms of active enjoyment. Events are other important motive to visit urban green spaces, such as group music performance, concerts, Christmas carol concerts, orchestral performance, craft fairs, fun fairs, opera, circus, firework displays, bands playing, dancing, etc.

Making inhabitants aware of the existence of urban green spaces and using values contributing to urban inhabitants' lives in the form of a more balanced quality of life

and lifestyle, encouraging physical and mental fitness, reduces tensions and conflicts, relieving the harshness of the urban environment, providing places for social and cultural interaction in informal contacts and more formal participation in social events, social inclusion, recreation, aesthetic pleasure, wildlife, and fostering community development.

Urban green spaces are natural meeting points for local inhabitants facilitating social inclusion and integration, community cohesion, social capital, civic society, supported by an increasing sense of identity and belonging (Konijnendijk et al. 2013a; Abraham et al. 2010). By providing a meeting place for social interaction and integration between community users, green spaces influence social capital. Inhabitants living near urban green spaces reduce health inequalities and have lower circulatory diseases (Mitchell and Popham 2008). Inequitable distribution of green spaces correlates with the distribution of disadvantaged inhabitants.

Passive activities are the main reason why users visit urban green spaces such as passive or informal enjoyment of the environment, social activities and attending events, getting away from it all, walking activities including dog walking, active enjoyment including sport and specific activities. Surveys have shown that people are less stressed, communicate better and make sensible decisions when surrounded by green spaces.

Urban green spaces can be linked as wildlife corridors to facilitate the movement of fauna, preventing fragmentation and isolation of wildlife (Rouquette et al. 2013; Hale et al. 2012). Urban green spaces are home to many species, including those that are rare and threatened and the habitat for pollinators. More urban green spaces sustain more wildlife and biodiversity, providing a more favorable habitat, therefore requiring more protection from human interference (Cornelis and Hermy 2004; Fuller et al. 2009; Schwartz et al. 2002; Baldock et al. 2015). Creation, protection, and development of urban green spaces are relevant elements of sustainable urban development.

Urban green spaces have an impact on human thermal comfort and air quality on human health (Cohen et al. 2012; Weber et al. 2014; Nowak et al. 2014). Comparisons of the impact of green space air quality and heat show that a greater predominance of trees mitigates urban heat islands, provides thermal comfort, and improves air quality. Green spaces reduce urban heat islands and air pollution, improving air quality in urban settings (Bowler et al. 2010). Community-level air quality is dependent on the tree population (Morani et al. 2011).

A community's green spaces are associated with reduced household pollution material exposure (Dadvand et al. 2012). Vegetation density in green spaces is associated with pollution mitigation (Yin et al. 2011; Dzierżanowski et al. 2011; Escobedo and Nowak 2009; Nowak et al. 2013, 2014, Tallis et al. 2011; Tiwary et al. 2009; Tsiros et al. 2009). Bushes instead of trees may retain more pollution particles and reduce concentrations (Wania et al. 2012). A diversity of tree species including evergreen, conifer, and deciduous tree species have complementary air-pollution uptake patterns and provide maximum air-quality improvements (Manes et al. 2012). Trees and shrubs are more effective at removing pollutants than herbaceous perennials (Rowe 2011).

A diversity of evergreen and conifer tree species provides complementary air-pollution mitigation. Coniferous trees are the best for capturing pollutant material (Tallis et al. 2011; Tiwary et al. 2009) and the evergreen, rather than deciduous trees in green spaces, provides more cooling and below comfort conditions in winter (Cohen et al. 2012; Zhang et al. 2013). Evergreen and deciduous trees remove more atmospheric 03 (Alonso et al. 2011) than conifers.

The cooling capacity of green spaces is affected by multiple variables such as density, size and shape associated with an increase in air quality. Urban green spaces reduce heat, ozone, and ultraviolet (UV) radiation and improve air quality (Roy et al. 2012; Konijnendijk et al. 2013b; Bowler et al. 2010). Absorbing pollutants improve air quality. Research based on modeling has weak evidence that capturing pollutants and particles by urban green spaces improves air quality (Konijnendijk et al. 2013a). Wong et al. (2013) reviewed the evidence for the relationship between green spaces, heat and air quality considering variables such as green space type, climate, method, etc. Building orientation and heights affect cooling and air quality from green spaces.

Urban green spaces reduce the UHI effect by cooling the air on average by 1°C and by providing shade. Cooling is influenced by plant type, green patch size and density, temperature, and wind (Armson et al. 2012; Cao et al. 2010; Feyisa et al. 2014; Fintikakis et al. 2011 Fröhlich and Matzarakis 2013; Gaitani et al. 2011; Konijnendijk et al. 2013a; Lafortezza et al. 2009; Oliveira et al. 2011; Onishi et al. 2010; Vidrih and Medved 2013). Many characteristics of green spaces affect the cooling capacity such as size, cover, shape, density, and spacing.

Green space scale is the area or size of green space including a single or multiple sites. The green area impact scale includes the site and the adjacent nongreen areas. The percentage of covered greenspace (PLAND) equals the sum of the areas (m^2) of a specific land-cover class divided by a total landscape area, multiplied by 100 (Herold et al. 2003). There is a strong association between the size of green space and the cooling effects (Cao et al. 2010; Chen et al. 2014; Dobrovolný 2013; Feyisa et al. 2014; Hart and Sailor 2009; Li et al. 2012; Onishi et al. 2010; Susca et al. 2011; Weber et al. 2014). The size of the green space affects the urban cooling island because the cool air builds up and is emitted from the center (Vidrih and Medved 2013) and it is stronger during the summer (Chen et al. 2014; Li et al. 2012; Onishi et al. 2010; Susca et al. 2011).

Increased community green space is related to lower surface and air temperatures and reduced air pollution (Bassil et al. 2010). Studies are consistent in finding low temperatures and reduced air temperature in urban green spaces (Bowler et al. 2010). Average temperatures are lower inside the urban green spaces, confirming their impact on urban heat (Yu and Hien 2005). Mature trees remain relatively cool in an urban climate, in contrast to nongreen impervious surfaces, by providing shade, thermal comfort, reduction of air temperature, and relief from the effects of heat islands (Meier and Scherer 2012; Roy et al. 2012; Hwang et al. 2011; Lin et al. 2010; Lynn et al. 2009; Park et al. 2012; Shashua-Bar et al. 2012).

Temperature differences between green and nongreen spaces are greater during the hot periods of the day (Hamada et al. 2013; Doick et al. 2014). The cooling effects are greater during the times of the hottest temperatures (Bowler et al. 2010;

Cao et al. 2010; Cohen et al. 2012; Hamada et al. 2010; Hwang et al. 2011; Meier and Scherer 2012; Li et al. 2012; Oliveira et al. 2011; Park et al. 2012; Sung 2013; Zhang et al. 2013).

Changes in surface temperatures from green space are related to urban heat islands, but are not an indicator of thermal comfort improvement and heat stress reduction. Higher land surface temperature is significantly associated with lower income communities with larger ethnic minorities and older adults (Huang et al. 2011). Increased green spaces increase energy flows, while decreasing land surface temperatures (Li et al. 2012, 2013; Zhou et al. 2011).

Air temperatures in warm humid climates are significantly cooler within the urban green spaces (Oliveira et al. 2011) compared with nongreen areas (Vidrih and Medved 2013; Armson et al. 2012). Humidity tends to be higher in urban green areas than in inhabited zones. Densely inhabited areas without green spaces usually have an inadequate climate. Green spaces mitigate the effect of climate warming by providing shade. Replacing paved yards with urban green spaces reduces the heat island effect during the summer by moderating temperatures expected with climate change. Increased cover of community-level green spaces is associated with reduced air temperatures. The configuration and patch area of a community's green space have a relationship with personal exposure to air pollution at the household level, with cooler air temperatures and reduced urban heat island effects (Steeneveld et al. 2011; Li et al. 2012).

The main role and function of urban green spaces and gardens are to improve climate and reduce air pollution. The role and behavior of urban green spaces and gardens in improving climate and reducing air pollution. Pollution in urban areas is dependent on the type of architecture and proximity to green spaces. An avenue with a green space is less polluted because dispersion is better, whereas narrow streets tend to be more polluted. Walkways with large green spaces are better protected from pollution (Eliasson 2000). Planting more trees on street canyons may not be a good prescription where it may increase the concentration of pollutants (Escobedo and Nowak 2009; McPherson et al. 2011).

The predominance of trees has the greatest cooling effects, provides thermal comfort and heat stress relief (Chen et al. 2014; Cohen, Ng et al. 2012; Perini and Magliocco 2014; Cohen et al. 2012; Zhang et al. 2013). Different scales and types of green spaces have diverse cooling effects on heat mitigation. A comparison of green space types and scales may cause the effects to overlap. Green space scales have differential scales (Cohen et al. 2012). Green spaces with trees provide greater cooling than spaces with grass (Chen et al. 2014). Higher concentrations of green spaces are associated with greater cooling (Rinner and Hussain 2011). Connectivity between urban green spaces maximizes the cooling effects (Doick et al. 2014).

Other different types of green spaces are the green buildings that have a vegetated roof or wall serving for pollution, heat stress and urban heat island mitigation. Green roofs and walls provide heat island and pollution mitigation services.

A green roof is a roof of a building covered with vegetation planted over a growing medium and a waterproof dispositive. Green roofs combined with insulation provide heat mitigation (Coutts et al. 2013) and good irrigation provides cooling

(Zinzi and Agnoli 2012). Green roofs affect air quality by removal of air pollution comparable with mitigation effects of urban forests (Speak et al. 2012; Baik et al. 2012). Green roofs provide cooling effects and reduce the heat island in the urban environment (Smith and Roebber 2011; Susca et al. 2011). Green roofs and walls are an alternative in high-density urban areas for cooling and pollution mitigation. Green roofs maximize air quality by plant selection such as creeping bent grass and red fescue that have a higher level of particle capture (Speak et al. 2012).

Green roofs do not have an effect on the street level temperature, but decrease the cooling load of buildings (Perini and Magliocco 2014). Green spaces with trees are more effective than grass surfacing and green roofs planted with grass at reducing temperatures and improving thermal comfort (Ng et al. 2012; Chen et al. 2009). Green roofs reduce storm water run-off (Mackey et al. 2012). Green roofs for heat mitigation cost more (Mackey et al. 2012; Coutts et al. 2013; Smith and Roebber 2011; Zinzi and Agnoli 2012). The impact of wind on pollution, mitigating the effects of urban green spaces, is complex, but green roofs located downwind of prevailing winds have significant mitigation effects (Baik et al. 2012; Speak et al. 2012). Wind increases the cooling and pollution-mitigating effects of green space.

Green walls have positive cooling effects (Speak et al. 2012; Baik et al. 2012) and mitigate urban heat island effects through the evapotranspiration of plants (Susca et al. 2011; Smith and Roebber 2011). The cooling capacity of green walls increases with increased temperatures (Hamada and Ohta 2010; Koyama et al. 2013). Green walls with low wind speeds reduce air pollution in the street canyon (Amorim et al. 2013). Green walls are more effective than green roofs at mitigating in-canyon air pollution (Amorim et al. 2013; Buccolieri et al. 2011; Koyama et al. 2013).

Trees in an urban green infrastructure capture and sequester carbon, mitigating the negative effects of emissions. Carbon sequestration is the removal of the greenhouse gas carbon dioxide and its incorporation into plants. Any green spaces balance carbon, taking more than they return to the atmosphere (Nowak et al. 2013; Nowak and Crane 2002). A forest in a green space maximizes carbon sequestration (Strohbach et al. 2012).

Methodological Considerations

Urban green spaces reflect the need for natural and landscaped areas within the cities. Cities have mixed land use such as residential areas, industrial areas, forest and agricultural areas, but most are man-made environments such as built-up areas and urban green areas, and water. Large cities have lost natural resources and invest more than medium cities that have more natural green areas (Tuzin et al. 2002). Urban green spaces have a critical value for planning and developing sustainable eco-cities. In cities with a higher rate of growth population density, urban green spaces tend to be reduced at the expense of the urbanization process. There are variations in areas given over to urban green spaces in cities, for example, Singapore has 47% and Sydney 46%.

Community involvement, engagement, and development require a methodology to ensure that local authorities meet the needs and aspirations of local users in the community. Some of the methods employed are the literature review, the survey of local authorities, structured interviews with authorities and a review of their documents, analysis of existing data on uses and users, and more detailed examination of a case study.

An analysis of the green space deals with the physical and quantitative, functional, ecological, environmental, economic, and quality aspects. Economic aspects are the expenses of development, costs of maintenance, financing, and budget sources. The quality of the urban green space experience needs to be studied from an interdisciplinary perspective, drawing on both natural and social sciences. Some of the physical quantitative indicators are the supply and distribution of natural and landscape resources of public green areas as a percentage of the city area, the square meter per capita, and structural and morphological characteristics. Quantitative evaluation of the relationship between urban population and urban green spaces takes into account functionality, the green space ratio, green space coverage, and green space area per capita (Xion-Jun 2009). The quality aspects of urban green spaces are the suitability and quality of the site structure, design and provision, and the quality of the conditions.

Finding meaningful information on the uses and users of urban green spaces is hampered by inconsistencies with regard to information from local authorities. The use of model surveys to collect information from users of green spaces regarding the satisfaction of needs and aspirations needs to be developed through pilot studies and consultation by researchers and local authorities. Consultation on and involvement in environmental issues identify the community's needs. Also, the results of research find evidence for the differentiation of the need to have a green space close to where they live, as opposed to where they work (Greenspace 2007).

The user's perceptions of urban green areas matter to the community's image and decisions on uses. Perceptions of the image of urban green spaces affect uses and user aspirations and the value to the community of creating, designing, meeting the needs, and sustainably managing. The issues more related to designing are the variety, activities, spaces, sensory stimulation, vegetation, water, birds, animals, etc.

A sound basis for the collection and analysis of data is the means of finding out the priorities. A pool of data should be collected and analyzed to find out priorities in terms of type, quantity and quality, location, and accessibility. The amount of green space has been reduced by the trend toward more a compact urban environment (Burton 2003). The observed current trends on urban green spaces suggest increasing degradation and without support, the process is not likely to be reversed. An expert study that is already available may help to compare and check the planning context and legislation.

Users of Urban Green Spaces

Meeting the needs of users is related to issues of awareness of needs, the nature of the facilities and their conditions, the opportunities for activities, events and playing, the provisions of conveniences such as toilets, shelters, seating, and refreshments. Users

of urban green areas develop patterns of informal and passive activities, with peaks in the afternoons, weekends, and holidays on a daily basis. Involvement in urban green spaces leads to the creation of facilities to meet the needs of users users who have more experience and demand higher quality. Facilities of urban green spaces must meet the environmental, socioeconomic, and psychological needs and attitudes of the user (Balram and Dragicevic 2005). Meeting the users' needs at local environmental, social, and economic levels requires the development of local standards, such as the provision of urban green space per head.

In one piece of research, users of urban green spaces manifested psychological effects (Dunnett et al. 2002). A significant relationship was found between the use of green spaces and levels of stress (Grahn and Stigsdotter 2003). Green spaces in the living environments also positively affect stress and quality of life. Urban green spaces reduce stresses for users and provide them with a pleasant positive distraction (Ulrich et al. 2010). The use of green spaces is associated with less stress. Viewing nature and urban green spaces ameliorates stress levels (Ulrich 2002).

Natural green environments have restorative effects and pleasing stimuli promoting soft fascination (Forest Research 2010). Also, users are happier and have greater well-being when they live in an urban area with large green spaces (White et al. 2013). The evidence between green spaces and physical activity is strong; although beneficial links have been reported between urban green spaces and emotional, psychological and mental health, and well-being, the evidence is weak. Large urban green spaces contribute to the physical and mental health and well-being of users.

There also appears to be seasonal patterns affected by the weather. Other reasons for using urban green spaces are for walking, including dog walking, passive and active enjoyment of the environment and sports, social encounters, and activities.

Accessibility to urban green spaces is related to ease of access by proximity with no physical barriers, transportation, open gates at an early hour, accessibility for disabled people, information on cues and path-finding features, maps, information at the entrance, path junctions, slopes, and cambers, an attendants for those with disabilities and visual impairment. Improving safety issues requires changes in the use of fencing, lighting, staff or rangers, removal of cars, restriction of cycling, roller-skating, and roller-blading, etc. Urban green areas are safer gathering places for children and young people, at least safer than being on the street.

User determinants such as gender and age affect accessibility and quality of urban green spaces and other environmental factors. Access to green spaces facilitates their use and increases the level of physical activities. Accessibility to green spaces has an impact on urban socioeconomic health inequalities. There are links between access to urban green spaces and social integration among older adults (Forest Research 2010). The availability of green spaces is associated with increased survival of elderly people.

Unequal distribution of green spaces and reduced access to green environments are related to health inequalities and increases in pollution and intense heat (Alberti and Marzluff 2004; Cohen et al. 2012; Girardet 1996; Gregg et al. 2003; Grimm et al. 2008; Hough 2004; Moore et al. 2003; Newman and Jennings 2008). Deprivation levels are linked to access to green spaces. Distance from the green spaces is related

to physical activity; thus, users living nearby report higher levels of physical activities, although there is no correlation with accessibility to green spaces. Proximity to green spaces is associated with self-reported health.

Increasing green spaces and optimizing spatial configuration mitigate urban heat (Choi et al. 2012; Rinner and Hussain 2011). The ratio between the urban heat area and the urban cooling area increases with the distance from the urban green space (Choi et al. 2012). There is a negative correlation between the percentage cover of urban green spaces with a land surface temperature related to the distance where the closer it is, the stronger the cool island effects. Modifying variables that affect the relationship between green spaces and heat include density, distance, wind, temperature/season, the surrounding built-up environment, and precipitation.

Urban green space distribution inequities and neighborhood quality affect urban health inequalities. Inequalities in green space quality may affect urban health inequalities. There is evidence for the relationships among green space, heat, air pollution, and health (Lachowycz and Jones 2011; Lee and Maheswaran 2011). Heat and air pollution-related health inequalities are associated with green spaces. Urban green space distribution is related to health inequalities. There is evidence in the relationship between air pollution and heat mitigation from green space having positive effects on human health. Disparities and inequalities in distribution lead to pollution "hot spots" and green deserts (Escobedo and Nowak 2009; Huang et al. 2011; Jesdale et al. 2013; Su et al. 2011).

All types of green space are associated with reductions in heat stress, urban heat islands, and air pollution. Green space density as the relative tree cover affects the relationship between green space and the mitigation of air pollution (Baik et al. 2012; Doick et al. 2014; Tsiros et al. 2009). Community green spaces are associated with lower exposure of air pollution at the household level (Dadvand et al. 2012). Greening has different impacts on heat and air pollution (Alonso et al. 2011; Nowak et al. 2014), on individual and household-level exposure to air pollution (Dadvand et al. 2012; Maher et al. 2013). Reductions of air pollution from green spaces are insignificant relative to urban-based emissions (Baró et al. 2014). Wind increases heat and air pollution, mitigating the effects of green spaces.

Unequal distribution of green spaces are related to health inequalities derived from heat and air pollution (Escobedo and Nowak 2009; Huang et al. 2011; Jesdale et al. 2013; Su et al. 2011). The uneven distribution and quality of green spaces related to mitigation of heat and air pollution is associated with health inequalities. Green spaces have differential scales of health impacts associated with reductions in air pollution and heat (Bowler et al. 2010; Roy et al. 2012). A relationship has been identified between urban green spaces, air pollution, and health inequality (Su et al. 2011). Mitigation of pollution and heat from green spaces has a direct impact on health (Nowak et al. 2014).

Access to urban green spaces for the elderly, the disabled, children, women, and minority ethnic groups concerns issues such as ease of entrance, proximity, social inclusion, provision for the visually impaired, public transport, parking, moving safely, and surface design. Awareness and understanding of social inclusion in urban green areas is a recognition of the particular social and cultural needs and aspirations of users who are most likely to be excluded in society.

Some users of urban green areas are concerned about environmental quality issues such as litter, dog mess, graffiti and vandalism, lack of garbage cans; garbage and items such as condoms, food put out for birds that has been left lying around (Gregory and Baillie 1998); smashed bottles and broken glass. Psychological issues related to the use of urban green areas prevent users from going alone because of the feeling of vulnerability, fears, safety concerns, laziness, loneliness, lack of confidence, inertia, etc.

Some negative economic impacts of urban green spaces may be a fall in profits and potential problems derived from gentrification of the area as a result of increasing the added value of land and increases in housing prices. Negative impacts identified with green spaces are the increased green density, which increases street canyon air pollution detrimental to health (Amorim et al. 2013; Morani et al. 2011). Other negative impacts of green spaces is the tree emissions of biogenic volatile organic compounds that increase the levels of ground-level ozone (Escobedo and Nowak 2009; Roy et al. 2012). Green spaces with high BVOC-emitting tree species reduce ground-level ozone. Some negative impacts and trade-offs of green spaces are exposure to pollen and physical injuries.

Some of the personal issues that deter people from using urban green spaces are factors such as not having enough time, working unsocial hours, poor health and mobility, preferences for visiting other places, issues related to the location of urban green spaces, accessibility, user experience, and environmental quality. Other personal issues can deter users from going to urban green spaces, such as having their own park, changing circumstances, family and parental restrictions. To increase parental responsibility, training sports sessions for children and young people, encourage the active participation of parents. Users of urban green spaces are deterred by a lack of or deficient facilities, the influence of undesirable people, safety issues and psychological concerns, dog mess, litter, graffiti, and vandalism.

The deterrent effects of other users are related to conflicts between children and young people, teenagers, with adults, drug users, undesirable characters, users drinking alcohol, verbal abuse, gay men, bikes and skateboards, gamblers, noisy people, and being crowded, etc. The study of the urban environment combines the sound levels, biodiversity and green spaces. The results of this study confirm that the planning and designing of urban green spaces are enhanced by the ecological quality in issues such as noise levels of livable and sustainable communities (Williams et al. 2000; Girardet 2004). The soundscapes of green urban spaces have been less well-studied.

The declining quality of urban green spaces contributing to a decline in the urban quality of life has been studied by Irvine et al. (2009). Dog mess is a critical concern in urban green spaces and requires special attention such as dog-free areas and areas for dogs, good positions of dog bins in suitable locations, dogs on the lead and controlled, dog toilets, proper use of fines, etc.

The most relevant emerging barriers are the resource issues rather than personal concerns regarding the lack of facilities, the lack of maintenance, including play opportunities for children; not enough to do, the negative influence of other green space users; dog mess and dogs not being on a lead; physical safety and other

psychological concerns such as fears concerning environmental quality, including litter, vandalism and graffiti, accessibility, poor public transport, distance, a lack of or poor facilities, a neglect of spaces and facilities, the conditions of play areas and play equipment, the lack of playing opportunities, inefficient staffing, poor conditions or a lack of toilets, seating, poor lighting, lack of provisions in spaces for children, the elderly, and for women.

Non-users of urban green spaces are people who have used them once in the last year or never. Infrequent users are those who have used these spaces only once in the last 6 months. Some of the reasons for non-use and infrequent use of urban green spaces are public drinking, vandalism and policies of care in the community, dog mess, perception of an unsafe environment, concern for personal safety and security, fear of violence, fear of bullying and racist attacks, dark passages, lack of lighting, poorly lit paths, emergency assistance and telephones, predominance of playing fields, lack of attractive activities and facilities, failure to provide activities and experiences demanded by users, the lack of character of many parks, unfamiliarity with landscapes and open space cultures, an uncomfortable feeling of "otherness" (DETR 1996; MacFarlane et al. 2000; Thomas 1999; McAllister 2000).

Factors of Successful Community Involvement in Urban Green Spaces

Some relevant factors to improve the use of urban green areas are less dog mess, improved safety, better maintenance, better facilities, more events and activities, more staff and easier access to sites, a wider variety of things to do, dogs being on a lead, dog-free areas, more staff, provision of more seats, no motor vehicles, no cycling, no roller skating and roller blading, play areas, lower planting near paths, accessibility to an urban green space and being close to home, with parking facilities and good public transportation, an information center and information boards, displays boards, braille signs, maps signing posts with directions, etc.

Urban green spaces provide opportunities for all people to meet, regardless of their cultural, religious, ethnic origin, political ideology, sexuality, profession, etc. Urban green spaces are sites for community spirit, although different friends and users' groups have different levels of involvement, engagement, and development that range from the frankly adversarial to those that have already formed partnerships. Some community activities for children and young people could spring out around the urban green spaces, providing a free open gathering place, usually at weekends, during the summer time and holidays. Members of the friends' group can clean-up the urban green space every weekend.

As a result of a consultative process, local authorities committed to partnerships must consider demonstrations of the willingness of community groups and residents to get involved in some of the initiatives and take responsibility for tasks at the urban green spaces. In fact, some participants are willing to volunteer and engage in the green space proposals, providing a unique experience.

Partnerships offer an opportunity for the coordination of environmental regeneration programs at a potentially low financial cost. For this purpose, a priority proposal is to establish a user community group to include representative volunteer local members to work as a charity in partnership. Provision of other facilities that encourage the use of urban green areas are cafés, information centers, boards, toilets, sports areas, sporting events, dog litter bins, seating, parking, staffing including attendants, park wardens, and keepers, first aid facilities, boating, water features, and water plants.

Different models of partnerships between urban green spaces and communities require cultural change to move the emphasis onto community involvement and sense of ownership which results in caring, resourcing, involvement, creativity, and innovation. Some factors contributing to a successful involvement are the institutional culture of local authorities, community groups and users, resources and capabilities, sense of funding, investing, and ownership, voluntary commitment, and communication between stakeholders. The responsibility and ownership of urban green spaces should not be fragmented between different authorities and different structures to achieve more innovation, efficiency, and community involvement. Local authorities develop approaches to engaging and involving users through discussion groups, consultations, artistic events, sports activities, ethnic minority background activities, leisure programs, environmental and horticultural activities, community gardens, organic food growing projects, etc.

Community involvement and engagement in urban green spaces leads to enhanced quality of experiences and uses meeting the needs of users and long-term sustainability, giving access to additional funding and expertise. User groups usually set up priorities for urban green spaces where funding is available and consultation from local communities is required, tied as they are into yielding tangible results. Groups should be active to complement the capabilities of local authorities. One way to motivate is to provide grants for urban green space projects available to all groups. Urban green spaces are a catalyst for community projects because they revolve around the most relevant community issues and the potential for environmental, social, and economic change is derived from adequate funding and managing of resources. Therefore, the prominence of urban green spaces in communities is in the promotion for funding in community regeneration initiatives.

The development of friends' and users' groups needs to be managed by requiring commitment from local authorities, but also from the community, moving from the concept of the local authority's duty to provide services because they are already funded by taxes. Well-managed urban green spaces have an impact on the urban fabric in benefiting urban environment and wildlife, promoting healthier lifestyles, increasing urban attractiveness and the urban value of land and infrastructure. Nature has beneficial effects on health and wellbeing and mood improvement (Hull and Michaels 1995; Kaplan and Kaplan 1989; Irvine and Warber 2002), reducing stress (Ulrich 1981), managing mental fatigue (Hartig et al. 1991) and opportunities for reflection (Kuo 2001; Fuller et al. 2007).

Creative and innovative approaches to funding and resourcing of urban green spaces are required if designing the appropriate arrangement to make the best with

the available resources (DTR 1999). An innovative process is not exempt from conflicts. Conflicts arise among users and community organizations and groups who set up the trust. More innovative and creative local authorities are able to achieve more and better resources with less financial investment and spending. There are different methods of allocating, administering, and using the funding to be spent according to creative approaches aimed at enhancing the quality of life.

Access to additional funding by increasing the ownership of voluntary community involvement and group engagement with the local authorities. The multidisciplinary and multi-agency team enable the sense of ownership by local groups of the community, increasing their capacity building, and partner agencies to take risks using the grant, focusing on long-term regeneration and renewal objectives.

Local authorities should ensure that the backgrounds, culture and environmental resources, new expertise, skills, and interests brought in are in harmony so that the potential to develop is self-fulfilled without leaving aside the commitment and voluntary efforts of traditional users. Urban green spaces are focal for community volunteer groups to achieve change, providing facilities and activities to local users and involving and engaging other users. Activities developed by community groups in urban green spaces are most essentially voluntary actions such as conservation and maintenance tasks, although volunteer maintenance is coordinated by rangers and the feeling of ownership of upkeep is the responsibility of local authority.

Volunteers and trainees can be in charge of maintenance. Usually, voluntary community groups get involved in some of the routine operations and maintenance such as planting, grass cutting, cleaning, etc. Volunteering activities are more common in business groups conducted through staff initiatives. Active volunteers in the community need to be more motivated and negativity managed to achieve more active involvement, engagement and collaboration in a task-orientation approach with local authorities. A green space watch scheme run by volunteers can be set up in partnership with the police.

These arrangements can incur some risks, but can improve the facilities, infrastructure, maintenance, etc. However, after the initial investments, it is difficult to sustain the pace of change. Siting housing and business areas in green landscape environments is a means of promoting a green image, enhancing quality of life, and encouraging investment and economic activities. An eco-village can mix community development with providing good-quality accommodations for local residents.

Urban green space service delivery from environmental authorities may have a more holistic approach to policy and budget implementation. Resources available to local authorities and their efficient use make better provision of quality service delivery. One of the main problems facing the urban green spaces is the capital and financial resources and budget decline in real terms by the spending per head of population for funding urban green space projects. Spending per head does not necessarily take into account the area of the green space. Comparison can be made with regard to the spending per head and per hectare of green space, despite the fact that there is no consistent methodology. Urban green space officers must have expertise in community involvement and engagement, with environmental training.

Community engagement and involvement occur with a change of institutional culture of the local government and changes in the users' culture. Sensory stimulation experiences, such as gardens to smell and touch, statues, warning sounds and colored items such as seats, litter bins, lights shining on the water at night stimulation through running water, scented plants, quacking ducks, calm flowery areas, etc., should be provided. Planting programs with volunteering users from a community not only inject color, but also the sense of identity.

Diversity of vegetation and greenery is one of the most important elements of urban green spaces, color for aesthetic appreciation, grass, trees, flowers, natural trails, wild plants, an arboretum with labeled plants, plant names in Braille, and all varieties of plants such as tropical species. Animals within the urban green spaces are also an important element for children, such as birds, ducks, etc.

Determining the economic value of urban green spaces considers their natural resources. Some economic factors of urban green spaces include the production of wood, the supply of fruits, the economic value of the area, job creation, tourist attractions. Urban green spaces are of ecological value (Bilgili and Gökyer 2012) (which has become a necessity together with aesthetic and recreational value). Evidence for the value of green ecological networks to wildlife is limited, although it has become an element of urban planning (Tzoulas et al. 2007). Ecological and environmental aspects are the biodiversity and ecological values, urban climate, and natural corridors.

This vision must be agreed and shared with all the users and stakeholders and local authorities. A vision can develop and protect the quality standards of using urban green spaces, in healthy and pleasant environments and improving new uses and ensuring sustainability with high ecological and environmental value for healthy living, offering well-designed and -maintained green space, meeting the demands of users, ensuring participative action and accessibility, stimulating socioeconomic development and quality of lifestyle in the community, and contributing to the spatial identity. The concept of economic development linked with the environment is one of the principles.

The spatial concept of urban green space incorporates green into the urban structure and is related to the concept of a green system, a network of corridors. A spatial concept for urban green space development describes and incorporates green issues, interconnects the existing urban spaces and the future desired network and their relationships with the hinterland of the city. Green spaces are related to and connected to green networks and green corridors, defining preservation, improvement and development areas, the neighboring countryside, the regional green network, pedestrian and cycling paths, etc.

The quality standard measures the amount of urban green spaces per inhabitant for each type based on providing appropriate sizes for different activities, security and protection, distance and accessibility based on the travel time and the willingness to walk. Regulations and standards ensure the quality standards of accessibility of users to urban green spaces. Guidelines and standards for the provision of quality services are set out. Some standards related to urban green spaces are recreation areas near to residential districts, larger recreation areas with multifunctional uses,

protection for open spaces, nature protection, local climate, land use, and soil sealing (Stadt Leipzig 2003). Combining various factors results in rendering a standardized method of classifying urban green spaces virtually impossible.

Planning and design of urban green spaces consider the recreational and visual attraction, residential and business areas, leisure and tourism development (Dole 1994). International tourism is attracted by the creativity, innovation and quality of urban green spaces, but also rolling programs of garden festivals. A scheme can include a festival space, market, fairs, etc., once the greens have been invigorated and their uses revitalized.

Urban green areas can provide countryside activities and educational activities to children outside school hours and to adults through training programs, workshops, and cultural events on urban regeneration initiatives ranging from horticulture, maintenance, school education visits on nature, art activities, lectures and training on environmental education, vocational qualifications in horticulture, animal husbandry, and a 4-week summer play scheme. Also, children are supported by their schools in some activities related to the environment, ecology, tree planting, etc., for example, providing an eLearning module to increase awareness and knowledge. Educational institutions can benefit from making use of urban green spaces for educational, sporting programs and community-based education activities for children, young people, and adults. Urban green spaces offer children the development of a social environment to improve cognitive and motor skills, and to achieve higher levels of creative play, socialization, more collaboration, and emotional resilience (Forest Research 2010).

A partnership structure that enables a crosscutting integration of community group initiatives with officers of local authorities and the urban green space in a network to coordinate responsibilities, developing action plans and activities to improve biodiversity and improve the environment as a whole. The action plan describes the specific tasks for implementing and achieving each type and each issue, actions, timescale, potential funding sources, and partners. Local authorities of urban green spaces, acting as the eyes and ears of the friends and user's groups work as a partnership shaped by community orientation. Unintended consequences of urban green spaces are avoided with community-based decision-making (Jesdale et al. 2013; Su et al. 2011). Partnerships raise the quality of urban green space.

Partnerships among business, agencies, and communities with the local authorities make base-line funding available to achieve higher and better added value, far more than can be achieved by a local authority alone. Effective partnerships among local government, business, agencies, neighborhood organizations, and community groups can add financial and quality value to the green spaces. The identification of spatial, organizational, and financial problems with regard to the planning and management of urban green spaces, such as distribution, change of use, green corridors, and networks. Among the organizational problems are communication and cooperation problems. Financial problems are related to funding. Other important arrangements for increasing and making more efficient financial resources are among others, partnerships with grant-making foundations, private financial initiatives, community and business groups, targeted grant funding, and creative initiatives to increase revenue spending.

External funding and resources from externally funded capital programs amount to a small proportion of the budget required to maintain quality standards, although they are essentially crucial for capital works. Other forms of external funding are the so-called landfill tax credit scheme and private and business sponsorship that enable creation and operation of facilities and a wide range of financial private initiatives as a means of injecting private capital. Partnering to achieve external funding and expertise from community and business involvement is a formula for raising quality standards. An active sports program of events can attract funding so that it can be financially self-supporting.

Creative and innovative approaches for external funding from community and business groups are usually selective in their applications such as tackling deprivation. Local authorities have to change radically to find and make use of the best opportunities available for external funding through partnerships. Other relevant factors important for success are political support and networking support. Some factors contributing to external funding are the political will of the local authorities to match funding to urban green spaces by embracing an entrepreneurial culture and creativity of external funding officers to investigate sources and resources through partnership opportunities. Voluntary activities enable volunteers with creative, innovative and entrepreneurial capabilities and skills to contribute to urban renewal by pursuing personal development. Bringing the necessary external resources to the urban green spaces by managing change through the involvement and engagement of local residents requires professional input expertise to discuss and accept the evolving structure.

Private sponsorship should make more significant contributions in budgeting and enabling more facilities. The bulk of urban green space is transferred by contract to a private contractor, but accountability and quality monitoring roles are retained essentially through consultation mechanisms and to ensure public accountability and quality of service delivery.

Financial values result in increasing land prices, attracting more inward investments, economic growth and development, community economic spin-offs, etc. Urban green space is one of the main drives to attracting investments and multinational corporations that usually choose to build facilities taking into consideration the urban environment and landscape (Baycan-Levent and Nijkamp 2009; Wuqiang et al. 2012).

Urban green spaces are the catalyst for social economic spin-offs in the community, such as sports activities, community centers, training programs, job creation, etc. Urban green space-based groups counting on the right individuals involved, have the potential for spin-off effects in the community. Quality values are more intangible and may result in community strengthening and environmental quality. These programs and projects can be carried out in partnership with local business, industry, companies, and financial organizations in a continuing involvement with local schools, universities, research centers, museums, heritage organizations, local authorities, local community, neighborhoods and people, green and environmental societies and organizations, etc.

Partnerships among local authorities, funding agencies and institutions, community groups, and business can contribute time and resources to adding value and quality. Partnerships can be with voluntary sector support, voluntary sector led and

managed, environmental/regeneration projects, and finally partnerships around a hub. Ground work trusts are locally based partnerships committed to national organizations as an area-wide player and as a network with local operators, although sometimes they have difficulties securing a long-term commitment and leave the community with aspirations to continue the project.

Trusts are an alternative for recreation and amenity facilities, environmental and wildlife, potential new business, and urban opportunities. Urban green spaces have the capacity to be attractive to local, national, and international leisure visitors, while playing a beneficial role for the brand of the city. Thus, they indirectly play a role in location business decisions. Research has found a positive correlation between urban green spaces and business location decisions (Woolley and Rose undated for CABE), although there is little reliable evidence for the effect of green spaces on the decision to locate in a certain area and on economic growth and investments (Forest Research 2010). Trusts and private finance initiatives are partnerships with communities in different situations, with different roles of partners, including appropriate safeguards. Trust partnerships provide assistance at the level of the friends' groups.

Value-added benefits that essentially result from community involvement and engagement are contradicted by the costs and problems derived from involving nonparticipative groups, because they requires capacity building and development. The costs of urban green spaces for local authorities include all kinds of resources such as human capital, financial investments, material, knowledge, etc. Other costs are conflicting demands. Communities face the costs of responsibilities, the skills balance in services, the commitment of volunteers, etc.

Some costs associated with the involvement of local authorities in community development are a lack of long-term vision, the increase in workload without a complementary resource, a major demand on resources, greater expectations, motivating and maintaining momentum in capacity and supporting groups, over-reliance on volunteers and jealousy, identification of good leaders and representativeness in the community, lack of appropriate capabilities and skills, a hard learning process, maintaining volunteer commitment and responsibility, community development and maintenance, managing demands that conflict with and contradict constructive engagement, extending and delaying the process, job security, and successful community development. Volunteers receive training and are hired when there is funding, thus building capacities and promoting employment and ensuring commitment to the project.

Challenges and Opportunities

Some of the important challenges faced by urban green spaces are the structural and organizational changes in service delivery, re-engineering the staffing, redesigning and refurbishment, involving communities and agencies to promote the cause, providing guidance and sharing experience in good practice, avoiding duplication

of responsibilities and stimulating active cooperation. Good practices are successful initiatives that are transferred and utilized in similar situations.

One of the most important challenges that mankind faces are sustainable urban green spaces where more than half of the world's population live and need to improve their lifestyle. Urban green spaces provide environmental, economic, social, political, cultural, and psychological services for the wellbeing and have an environmental sustainability impact on human activities, a role that cannot be ignored by policy makers. Use of urban green spaces improves wellbeing, reducing anxiety and depression. These impacts raise awareness of the rational use of natural resources. Environmental sustainability of any urban agenda must be considered when designing, planning, managing, and maintaining the distribution and qualitative improvements of urban green spaces as an integrated approach to providing a quality service and delivering it to users.

A variety of social and physical opportunities are available in urban green spaces, a particular recreational activity, getting away from the demands of daily life and relieving stress. Some social factors of urban green spaces to be included are the biodiversity of land uses, healthy and active lifestyles, inclusiveness and social justice (Thomas 1999) and opportunities (Scottish Executive 2001). Urban green spaces offer opportunities for aesthetic experiences with a positive psychosomatic effect that reduces attention deficits and other cognitive disorders, stress and mental fatigue, and blood pressure (Tzoulas et al. 2007).

Urban green spaces are opportunities for community dwellers to be surrounded by nature and biodiversity and gaining more enjoyment from spending time (Dallimer et al. 2012). Users are willing to pay for access to green spaces if they receive in return the opportunity to see the richness of nature in the various species (Dallimer et al. 2014). Urban green spaces provide opportunities for physical exercise and better air quality. Opportunities and potential for green urban spaces included the spatial, structural and morphological, functional, and ecological. The ecological aspects of urban green spaces comprise the maintenance of a healthy environment with water, air and soil, diversity of wildlife and resources, reduction of the impact of human activities, preservation of natural and cultural heritage, and promotion of private investments to conserve cultural heritage.

The spatial system of the urban green space requires conservation, restoration, maintenance, improvements, protection of existing and developments of new spatial forms (Kong et al. 2010), taking into consideration the impedance in the habitats posed by land use and landscape. A green infrastructure in a green network provides an overall value by offering opportunities for wildlife including various species of animals, birds, and insects. The urban green space infrastructure provides natural drainage, water interception, infiltration, storage, pollutant removal, surface flow and rainwater runoff reduction, and water quality. The storage of water in green areas is superior in quality to the runoff from streets, roads, and roofs (Hou et al. 2006; cited in Zhang et al. 2012).

Evaluation of the current conditions and economic perspectives is important for achieving results in relation to costs. Urban green spaces combine both monetary and nonmonetary valuations to assess the value. Green spaces are linked to

residential and commercial property values. Cost-benefit analysis of urban green spaces is a critical factor in policy action (McPherson et al. 2011). The cost-benefit analysis of green spaces is a trade-off. A cost-benefit analysis of green spaces should take into consideration all the significant benefits such as energy consumption, reduction of pollutant materials, effects of heat stress island, reduction of greenhouse gas emissions, storm water runoff, mortality rates, etc. (Mackey et al. 2012).

Conclusion: Public Initiatives and Actions

Urban green spaces are wider initiatives of local authorities and communities with environmental, social, and economic objectives that can justify any funding for all the represented and involved stakeholders. The institutional structural framework of urban green spaces is a design concern of local authorities in response to providing services for the satisfaction of users' needs. Urban green spaces must be large enough to satisfy the urban users' needs and aspirations and distributed throughout the total urban area in such a way that better relationships with the environment can be sustained.

Therefore, promoting cooperation relationships through networks between urban green spaces and groups of friends is usually a political issue of high priority and commitment for local authorities. Some of the driving forces of urban green space initiatives behind community development are to improve the poor state of development, to generate employment, and return to the greenery as it was in the past.

Public initiatives and actions supported by local authorities aimed at inhabitants with regard to urban green spaces, parks and gardens in public spaces should demonstrate their attachment to sustainable development and the environment. Grass roots initiatives usually form community groups to work toward achieving better provision of services. Local and community initiatives in a green space develop as a result of inadequate provision for users' needs and aspirations by the local authorities, or had not been developed because of a lack of resources.

Beyond this, there is also economic stimulation with the regeneration of the community. Urban green space stimulates social and economic regeneration of communities in a multi-agency area, beyond landscaping, which can be considered only a cosmetic change. The link between environmental regeneration and economic stimulation provides substantial infrastructure in housing, job creation, etc. Usually, policymakers underestimate the role of urban green spaces beyond the greenery or landscaping in urban regeneration to reinvigorate communities and neighborhoods, by improving lifestyles, making them more pleasant and attractive, increasing the land value, strengthening the community spirit and social networks, economic stimulation, etc. Urban green spaces play a relevant environmental, economic, social, and cultural role.

Green objectives must be integrated into spatial planning. Planning for distances between urban green spaces is required to provide climate cooling to communities and neighborhoods (Doick et al. 2014). Designing, planning and sustainable management should address the resources for improving urban green areas focusing on meeting the

users' needs in location, access and environmental quality, lighting, security and safety, playgrounds for children, the elderly, the disabled, and young people, dog-free areas, no vehicles, cycling or roller skating. Urban green spaces should be accessible, uniformly distributed, optimal in quality and quantity, large enough to accommodate the population's needs (Haq 2011), sustainable, and livable. These features should be considered at the stages of designing, managing, maintaining, and protecting.

The designing of urban green spaces results in good quality and variety of activities in open spacious areas, trees and spaces, exit points, quiet areas, a good network of paths, meadows, water, formal areas, meeting places, monuments, hills, mazes, etc. Designing play areas with community engagement provides opportunities for skill development and major satisfaction of the final users. External experts in design and mediation are very welcome to the task.

Designing and planning of urban green spaces must move from traditional park railings and interconnected webs to planning land uses for multiple purposes, that is, recreational and conservation uses with other purposes such as wildlife corridors beside streams and roads, public gardens on top of buildings, reservoirs and waterparks; flood prevention with canoe courses, hides and ornithological habitats in conjunction with sewage farms. Conservation planning of urban green spaces should ensure natural flora, fauna, landforms, water, air, soil, etc., and protect them from other land uses. Urban green spaces comprise habitats supporting a wide range of species, some of them with a conservation concern (Park and Lee 2000; Mörtberg and Wallentinus 2000).

Clean outdoor green spaces should provide facilities for pedestrian and cycle routes to promote well-being and health and encourage physical activities such as walking, jogging, trim trails, running, and cycling. Walking in green spaces, self-guided or led by guides for health walks on prescription, is a service that can be provided. Other offers are to promote healthy living by providing safe routes to school or business, facilitating journeys among home, the school, and the community. A green space surrounding schools lowers the levels of traffic-related pollution (Dadvand et al. 2015). Also, it is recommended to promote healthy lifestyles by growing vegetables and fruits in community urban green spaces.

Creating a sense of shared ownership for all users and stakeholders is crucial for communities using urban green spaces and may result in innovativeness, creativity, resourcing, funding, and care. Maintenance of facilities such as cafés involving community engagement recognizes the value of the services provided. The focus is on innovative and creative approaches to delivering urban green space services in the local communities. Innovation lies in applying principles with a more holistic approach to the urban green space as part of a wider network to meet the needs and aspirations of urban users. A green network improves environmental quality and safety by providing green routes and adjacent buildings, which can be business units, chapels, youth and children's facilities and diversification of activities to take advantage of further funding opportunities. There is no correlation between innovation practices and levels of spending.

This approach sets the framework for the greater potential of a range of creativity and innovation with the sense of empowerment and ownership streaming from the partnership collaboration between the local authorities and the users. To investigate

creativity and innovation in creating alternative models and developing funding partnerships may increase budgeting, and the use and spending of resources. On a plot scheme, green spaces can be adopted by groups or individuals, residents' and tenants' associations in agreements with local authorities. Any plot of any size across from a large area of green space, taking over parts of a street by the participants of the program adopting a plot, for example, who have the responsibility for clearing the site and maintenance. Despite residents maintaining the green area, the local authorities have the responsibility for the bulk of planting and landscaping and the community may use it for public events.

Urban green space renewal action plans require political attention and have a wide range of environmental, economic, and social regeneration, an increase in resources and investment and educational benefits, and contributes to improving the urban landscape and its use for recreation and enjoyment. Planned activities in urban green spaces for development operations may include: plant trails, biological corridors, botanical gardens, shared gardens, play areas for recreational use.

Urban spaces that could potentially receive biodiversity should be inventoried, including open spaces, abandoned wastelands, etc. Regarding water as an element of urban green spaces, fountains and waterfalls with sound, water for children's play, ponds with wildlife, rivers, streams, boating lakes, etc, should be included. A skate park, wheelchair activities, a graffiti wall, outdoor chess and draughts, and a community fishing space could also be provided.

Sport facilities in urban green spaces require changing facilities in good condition, so that users can dress correctly, play on football pitches, access to bowling greens, tennis, basketball courts, facilities for organized clubs and for casual teams, and the option to join in activities without being a member. Programs involving the elderly, such as playing bowls, children and young people, such as football, and women, etc., contribute to better social cohesion.

Spaces for musical performances provide opportunities for better cultural awareness in the community, such as active event programs concerts, theater, fairs, bandstands, etc.

An inventory should be made of resources and maintenance and building facilities for which the urban green space is responsible, finding new ways of reducing the costs of maintenance without a loss of green assets, such as using woodland spaces for recreation and protection from climatic conditions, also involving the extensive agricultural and agro-ecological use of urban green spaces and afforestation of derelict land green spaces.

Research Gaps

There is a research gap in the empirical literature, including a lack of data on the optimal size, characteristics, distribution, and the influence on health effects of green spaces (Bowler et al. 2010). Research into inequalities in urban greener environments is necessary to improve health equity. However, there is little research on the effects of green areas on carbon capture, although study on green spaces and

pollution looks at the link between carbon capture in green spaces' capacity for pollution and the absorption of particles. Research into the impact of urban green spaces on air pollution has been limited, showing moderate evidence that mitigates sulfur oxides, nitric oxides, carbon oxides, and particulate matter (Konijnendijk et al. 2013a; Yin et al. 2011). The urban green infrastructure contributes to carbon capture by building up carbon reserves in the soil (Forest Research 2010).

Green barriers are useful in protection from traffic emissions, but require further research to clarify the effects of green street canyon geometries, wind speeds, velocity of air pollutants velocity, types of vegetation, etc. Furthermore, a research gap has been reported by Bowler et al. (2010) on the cooling effect on nongreen areas adjacent to urban green spaces. The impact of small green urban areas on heat have also been less frequently explored (Oliveira et al. 2011; Bowler et al. 2010).A final gap in the research on urban green spaces is the reduction of a habitat to one independent variable, such as levels of vegetation (Kuo et al. 1998a, b), overlooking the structural complexity of biodiversity patterns interacting with social and psychological benefits and bypassing the intangible benefits associated with socioeconomic factors (Pickett et al. 2001; Hope et al. 2003; Martin et al. 2004; Kinzig et al. 2005).

Cross-References

- ▶ Collaboration for Regional Sustainable Circular Economy Innovation
- ▶ Environmental Stewardship. Achieving Purpose and Community Cohesion Through
- ▶ Just Conservation. In Defense of Environmentalism
- ▶ Responsible Investing and Environmental Economics. Green Finance and the Transition to a Green Economy
- ▶ Sustainable Living in the City. The Case of the Urban Ecovillage
- ▶ Smart Cities. New Urbanism and New Agrarianism as a Path to Sustainability
- ▶ Strategic Management Innovation of Urban Green Spaces for Sustainable Community Development
- ▶ The Theology of Sustainability Practice. How Cities Create Hope

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