

# **The Benefits of Urban Parks, a Review of Urban Research**

**Mohammad Mehdi Sadeghian\* and Zhirayr Vardanyan**

Institute of Botany, National Academy of Sciences of Armenia, Yerevan, Republic of Armenia

*Corresponding author:* Mohammad Mehdi Sadeghian

**ABSTRACT:** Urban parks are one of the most important components of cities and they have had an evolving role in the life of city residence. This role has ranged from relief the city to the mediator between humans and nature. This report presents the findings of a major literature review relating to benefits of urban parks. The review considers material from sources that include peer-reviewed literature, library and internet. The results of the study revealed the benefits of urban parks in four categories. Environmental Benefits including Ecological Benefits, Pollution Control, Biodiversity and Nature Conservation. Economic Benefits including Energy Savings, Urban parks and water management, Property Value. Social and Psychological Benefits including Recreation and Wellbeing, Human Health and Tourism actually Reducing Crime. Planning and design, including perceptions of green space, aesthetic values, the planning and design of green space.

**Keywords:** Environmental, Social, Economic, Planning and Design Benefits.

## **INTRODUCTION**

This report presents the findings of a major literature review relating to benefits of urban parks in four categories.

### ***Environmental Benefits: Ecological Benefits***

Urban green spaces supply to cities with ecosystem services ranging from maintenance of biodiversity to the regulation of urban climate. Comparing with rural areas, differences in solar input, rainfall pattern and temperature are usual in urban areas. Solar radiation, air temperature, wind speed and relative humidity vary significantly due to the built environment in cities (Heidt and Neef, 2008). Urban heat island effect is caused by the large areas of heat absorbing surfaces, in combination of high energy use in cities. Urban heat island effect can increase urban temperatures by 5°C (Bolund and Sven, 1999). Therefore, adequate forest plantation, vegetation around urban dweller's house, management of water bodies by authorities can help to mitigate the situation. Green spaces that feature good connectivity and act as 'wildlife corridors' or function as 'urban forests', can maintain viable populations of species that would otherwise disappear from built environments (Haq, 2011; Byrne and Sipe, 2010). Regional green space is based on the protection and optimization of natural ecological system and actually refers to continuous suburban green space of large size. It not only improves the whole ecological environment of the city region and its neighbors, and provides important support of urban environmental improvement. Furthermore, introduction of suburban green space into city also acts as the base of ecological balance. In practice, problems of urban woods and citted agriculture should be paid sufficient attention (Wuqiang et al., 2012).

### ***Pollution Control***

Pollution in cities as a form of pollutants includes chemicals, particulate matter and biological materials, which occur in the form of solid particles, liquid droplets or gases. Air and noise pollution is common phenomenon in urban areas. The presence of many motor vehicles in urban areas produces noise and air pollutants such as carbon dioxide and carbon monoxide. Emissions from factories such as sulphur dioxide and nitrogen oxides are

very toxic to both human beings and environment. The most affected by such detrimental contaminants are children, the elderly and people with respiratory problems (Sorensen et al., 1997). Urban greening can reduce air pollutants directly when dust and smoke particles are trapped by vegetation. Research has shown that in average, 85% of air pollution in a park can be filtered (Bolund and Sven, 1999). Noise pollution from traffic and other sources can be stressful and creates health problems for people in urban areas. The overall costs of noise have been estimated to be in the range of 0.2% - 2% of European Union gross domestic product (Bolund and Sven, 1999). Urban green spaces in over crowded cities can largely reduce the levels of noise depending on their quantity, quality and the distance from the source of noise pollution. In the contemporary studies on urban green spaces consider the complex urban ecosystem, conservation of the urban green spaces to maintain natural ecological network for environmental sustainability in cities. For the cities in fast urbanizing and growing economy, country like China should consider the dynamic form of urban expanding to manage effective urban green spaces which will contribute to reduce the overall CO<sub>2</sub> by maintaining or even increasing the ability of CO<sub>2</sub> absorption via natural ecosystem (Huang et al., 2009). Air pollution is generally considered as a major concern in urban areas, and as being among the major risk factors contributing to the global burden of disease, with for example high levels of particulate matter (PM) air pollution being associated with excess mortality and morbidity in the urban population. Various studies have identified the beneficial influence of urban vegetation on ambient air quality (Cavanagh et al., 2009); although most of these studies infer the impact of tree coverage on urban air quality models rather than from experimental data (Yang et al., 2005; Nowak et al., 2006; Escobedo and Nowak, 2009). Pollution removal varies among cities depending on e.g., the amount of tree cover, with increased tree cover leading to greater total removal, but also for example the length of the in leaf season and a range of meteorological variables that affect tree transpiration and deposition velocities (Paoletti et al., 2011). (Cavanagh et al., 2009) detailed on the specific role of urban trees in air pollution reduction, mentioning their effects in terms of intercepting atmospheric particles and absorbing various gaseous pollutants (Yin et al., 2011). But trees can also lower air temperature through transpiration, which affects the photochemistry of ozone and reduces ozone production. Although the impacts of urban trees thus have been studied rather extensively, at least through urban air quality models, there is suggestion that research specifically on urban parks has been limited so far (Pataki et al., 2011; Yin et al., 2011). Parks often have high tree covers and can also have the character of woodland, which is relevant as the deposition of gaseous pollutants is typically greater in woodlands than in shorter vegetation (Paoletti et al., 2011).

### ***Biodiversity and Nature Conservation***

Green spaces do functions as protection centre for reproduction of species and conservation of plants, soil and water quality. Urban green spaces provide the linkage of the urban and rural areas. They provide visual relief, seasonal change and link with natural world (Francis, 1997). A functional network of green spaces is important for the maintenance of ecological aspects of sustainable urban landscape, with greenways and use of plant species adapted to the local condition with low maintenance cost, self sufficient and sustainable (Loures et al., 2007).

During the past decade research on urban biodiversity has become momentous not only because of the increasing impact of urbanization on natural ecosystems, but also because of the growing recognition of urban areas as hosts for innovative ways to conserve and promote biodiversity (Savard et al., 2000). The latter is illustrated by various global environmental conventions such as the 2002 World Summit on Sustainable Development, the 2007 Curitiba Declaration on Cities and Biodiversity, and the Global Partnership on Cities and Biodiversity launched by among others the United Nations Environment Program (UNEP 2012). Researchers have stated that urban parks, due to their often high levels of habitat diversity and microhabitat heterogeneity, can constitute particularly important hotspots for biodiversity in the cityscape, albeit their primary role is recreational (Cornelis and Hermy, 2004).

### ***Economic Benefits: Energy Savings***

Using vegetation to reduce the energy costs of cooling buildings has been increasingly recognized as a cost effective reason for increasing green space and tree planting in temperate climate cities (Heidt and Neef, 2008). Plants improve air circulation, provide shade and they evapotranspire. This provides a cooling effect and help to lower air temperatures. A park of 1.2 km by 1.0 km can produce an air temperature between the park and the surrounding city that is detectable up to 4 km away (Heidt and Neef, 2008). A study in Chicago has shown that increasing tree cover in the city by 10% may reduce the total energy for heating and cooling by 5 to 10% (Sorensen et al., 1997). Increased air temperatures can be expected to be particularly challenging in urban areas, where temperatures already tend to be higher than in the surrounding countryside (Oke, 1987). Climate change has a range of consequences for human health, including e.g., intensity and frequency of heat waves. (Oke, 1987) and

others have studied the impact of urban vegetation in terms of their possible cooling effect. Mechanisms at work in cooling by trees and other vegetation include evapotranspiration loss of water from plants as vapor into the atmosphere, which consumes energy from solar radiation and increasing latent rather than sensible heat, cooling the leaf and the temperature of the air surrounding the leaf. Shading from trees, which encompasses intercepting solar radiation and preventing the warming of the surface and air, is another mechanism, at work. Mechanisms depend critically on the type of vegetation (Bowler et al., 2010).

### ***Urban parks and water management***

Water management is crucial to cities, particularly in times of climate change. Cities often import water from surrounding areas in addition to converting land cover from vegetated surfaces to buildings, pavement, and other impermeable surfaces. This land-cover change radically alters the pathways and magnitude of water and pollution flows into, within, and out of urban systems. Surface water flooding describes the combined flooding in urban areas during heavy rainfall. Surface water flooding is mainly caused by short duration intense rainfall, occurring locally (Fryd et al., 2011 and Pataki et al., 2011). Bio swales, rain gardens, green roofs and other green infrastructure components can help reduce runoff. Increased infiltration would promote groundwater recharge and evapotranspiration from vegetated surfaces, and thus help to improve climatic conditions in the city (Pauleit and Duhme, 2000; Pataki et al., 2011). Urban landscapes with 50–90% impervious cover can lose 40–83% of rainfall to surface runoff (Pataki et al., 2011).

### ***Property Value***

Areas of the city with enough greenery are aesthetically pleasing and attractive to both residents and investors. The beautification of Singapore and Kuala Lumpur, Malaysia, was one of the factors that attracted significant foreign investments that assisted rapid economic growth (Sorensen et al., 1997). Indicators are very strong that green spaces and landscaping increase property values and financial returns for land developers, of between 5% and 15% depending on the type of project (Heidt and Neef, 2008). Different ways of estimating the economic value of nature have been explored over time. Especially in an urban setting, a way of indirectly assessing the economic value of green spaces is to study the impact of these spaces on house prices. If for example parks are valued by property buyers, this would be reflected in the premium they are willing to pay for the house or apartment. Quite a number of studies carried out, especially during 1990s. The real estate market consistently demonstrates that many people are willing to pay a larger amount for a property located close to parks and open space areas than for a home that does not offer this amenity (Crompton, 2001). (Luttik, 2000) in the Netherlands found that overlooking attractive landscapes and water resulted in a price premium of 8-12 respectively 6-12%. (Cho et al., 2008) studied the impact of forests on property prices in Knoxville City, USA and also found a positive impact on property prices caused by proximity of green spaces.

### ***Social and Psychological Benefits: Recreation and Wellbeing***

Urban parks have been viewed as an important part of urban and community development rather than just as settings for recreation and leisure. Urban parks have been suggested to facilitate social cohesion by creating space for social interactions (Coley et al., 1997; Van Herzele and Wiedemann, 2003; Parr, 2007; Maas et al., 2009). People satisfy most of their recreational needs within the locality where they live. A study conducted in Helsinki, Finland, indicated that nearly all (97%) city residents participate in some outdoor recreation during the year. Urban green spaces serve as a near resource for relaxation; provide emotional warmth (Heidt and Neef, 2008). In Mexico City, the centrally located Chapultepec Park draws up to three million visitors a week who enjoy a wide variety of activities (Sorensen et al., 1997).

### ***Human Health***

People who were exposed to natural environment, the level of stress decreased rapidly as compared to people who were exposed to urban environment, their stress level remained high (Bolund and Sven, 1999). In the same review, patients in an hospital whose rooms were facing a park had a 10% faster recovery and needed 50% less strong pain relieving medication as compared to patients whose rooms were facing a building wall. This is a clear indication that urban green spaces can increase the physical and psychological wellbeing of urban citizens. Certainly, improvements in air quality due to vegetation have a positive impact on physical health with such obvious benefits as decrease in respiratory illnesses. The connection between people and nature is important for everyday enjoyment, work productivity and general mental health (Sorensen et al., 1997). Nature and green spaces contribute directly to public health by reducing stress and mental disorders (Annerstedt et al., 2012), increasing the

effect of physical activity (Mitchell, 2012), reducing health inequalities (Mitchell and Popham, 2008), and increasing perception of life quality and self-reported general health (Maas et al., 2006; Stigsdotter et al., 2010). Indirect health effects are conveyed by providing arenas and opportunities for physical activity (Coombes et al., 2010), increasing satisfaction of living environment and social interactions (Björk et al., 2008 and Maas et al., 2009), and by different modes of recreation (Weber and Anderson, 2010).

### ***Urban parks and tourism***

Urban parks do not only provide recreational settings to local residents. Also visitors from out of town will use these areas. Urban parks can play an important role in attracting tourists to urban areas, e.g., by enhancing the attractiveness of cities and as harmonize to other urban attractions (Majumdar et al., 2011). (Wu et al., 2010) mention that within the field of eco-tourism, defined as responsible travel to natural areas that conserves the environment and improves the well-being of local people (TIES, 1990), there has been increasing attention to urban ecotourism, defined by the Urban Ecotourism Conference in 2004 as nature travel and conservation in a city environment.

### ***Reducing Crime***

Access to public parks and recreational facilities has been strongly linked to reductions in crime and in particular to reduced juvenile delinquency. Research supports the widely held belief that community involvement in neighborhood parks is correlated with lower levels of crime. In neighborhoods where collective efficacy was strong, rates of violence were low, regardless of socio demographic composition and the amount of disorder observed. Collective efficacy also appears to deter disorder: Where it was strong, observed levels of physical and social disorder were low (Sampson, 2001).

### ***Planning and design benefits of urban parks***

Planning and design, including perceptions of green space, aesthetic values, the planning and design of green space. Public perceptions of different types of green space were also evaluated by (Tyrvainen, 2003), who used forest image evaluation (291 respondents) to determine whether aesthetic and ecological values can be combined in the management of urban forests in Helsinki, Finland. This study showed that pine and birch stands were most preferred. Urban design gives the city a comprehensible structure, to connect different scales and parts of the urban parks. Urban parks planning and design should aim to produce spaces which are attractive and accessible to people; guidance on how best to do this and appropriate tools are needed. Urban parks design should aim to enhance the ecological functions of urban parks habitats. Different models can be adopted and tools are potentially available to help evaluate how well they function. Aesthetic benefits relate to people experiencing different colors, structure, forms and densities of woody vegetation. Much of the aesthetic experience is subjective in nature and has impacts on people's mental and emotional state (Kaplan and Kaplan, 1989).

## **CONCLUSION**

Urban parks have many functions and benefits. These functions and benefits are important for improve life quality in the urban areas. This report presents the findings of a major literature review relating to benefits of urban parks in four categories.

- Environmental Benefits including Ecological Benefits, Pollution Control, Biodiversity and Nature Conservation.
- Economic Benefits including Energy Savings, Urban parks and water management, Property Value.
- Social and Psychological Benefits including Recreation and Wellbeing, Human Health, Tourism and Reducing Crime.
- Planning and design, including perceptions of green space, and the planning and design of green space.
  - These are the main findings on Environmental Benefits of urban parks:
    - Urban parks improve air quality and cover also filters out other particles and dust in the air.
    - Urban parks provide flora and fauna, diverse habitat for mainly common bird and animal species and support biodiversity conservation.
    - Urban parks also improve the climate, reduce the heat island effect, cover raises humidity levels and help to improve micro-climate of urban areas where climate is warmer than their surroundings due to dense built environment.
    - Urban parks act as ecological corridors between urban, per urban and rural areas.
    - Daytime temperature in large parks was found to be 2-3°C lower than the surrounding streets.

- Urban parks can reduce noise pollution and absorb the noise generated by human activities, especially trees act like noise barrier.
- Urban parks control water regime and reduce runoff, hence helps to prevent water floods by absorbing excess water. The risk of flooding is lower where there are plenty of urban parks to intercept and absorb storm water.
- There is an increasing availability of tools for evaluating the environmental values of urban parks. These are very useful for planning and demonstrating values.
- Urban parks help to decrease carbon emission levels in cities. Through photosynthesis process in plants CO<sub>2</sub> in the air is converted to O<sub>2</sub>. Therefore, urban parks cover helps to reduce excess CO<sub>2</sub> in the urban atmosphere. Although the degree of trees' drawing carbon emissions from the air is affected by their size, canopy cover, age and health, large trees can lower carbon emission in the atmosphere by 2-3%.
- Trees can also act like wind breaker.
  - These are the main findings on Economic Benefits
- Urban parks Savings to employers from lower rates of absenteeism is likely to be extremely difficult to calculate. Urban parks provide employment opportunities during their design, construction and maintenance.
- Urban parks provide environments for walking, sports and other recreational activities for no cost at all, especially for lower income groups.
- The health benefits of urban landscapes can reduce the costs of national health expenses.
- Urban parks can help energy saving. Right selection and planting of plants can provide cooler environments in summer and warmer environments in winter thus reduce air conditioning expenses.
- As hidden asset to an area in part as a result of environmental quality, the values for tourism or savings to the economy as a result of lower absenteeism by employees as a result of better health effects are missing from the research base.
  - The findings for Social and Psychological Benefits are as follows:
- Urban parks play a role in providing places for social interaction. Social aspects such as social cohesion are associated with an overall sense of wellbeing for certain sections of society who may feel excluded for one reason or another.
- Urban parks provide different benefits to urban dwellers in diverse ways.
- Amount of vegetation is not necessarily associated with lack of safety or crime. The whole area of safety and design of urban parks is still open for much more research as the evidence to date is conflicting and may depend on many local factors, given the way the research has been conducted to date, with small groups of respondents in specific local areas.
- Urban parks are perceived differently by different age groups but this is not considered in practice to any large extent.
- Urban parks do actually promote social cohesion amongst and between different groups in different places, such as parks and gardens.
- Physical exercise in urban parks is generally positively associated with promoting wellbeing and upturn from stress.
- Being able to view urban parks also seems to have positive effects, especially on stress reduction or restoration.
- Safety aspects of urban parks covered here relate to children's play, where the need for safety has to be balanced against the need for challenging environments to excite children and to help them develop motor skills.
- There is evidence that some behavioral or emotional problems in children, such as attention deficit disorder, can be improved by exposure to urban parks.
- Health benefits and social benefits may be linked when people participate in communal or group activities in urban parks.
- Urban parks can enhance tourism in cities by attracting people.
- Issues of gender, society, ageing and disability have received limited attention.
- The closeness and ease of access of urban parks in relation to residential areas appears to affect the overall levels of physical activity.
- Urban parks can affect wellbeing in a wider sense.
  - The findings for planning and design Benefits are as follows:
- Urban parks planning and design make spaces which are attractive and easy to get to people.

- Urban parks should be evaluated with clearly defined criteria for their ecological and recreational benefits requiring a good set of tools to measure efficiency and benefits.
- Urban parks design enhances the ecological functions of urban parks habitats.
- Urban parks projects surrounded in their landscape, ecological and social context; this varies from place to place and so locally relevant knowledge needs to be developed.
- Urban design; to give the city a comprehensible structure, to connect different scales and parts of the urban parks.

Aesthetic giving to cityscape influences property values. Accessibility, quality and visibility are basic factors that determine economic value of urban parks.

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