

Article: The need of green areas in urban environments

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There are many different definitions of urban green areas, for the purpose of this analysis we will consider a broader view. Urban green areas can be defined as<sup>1</sup> all public and private open spaces in urban areas, primarily covered by vegetation, which are directly (e.g., active, or passive recreation) or indirectly (e.g., positive influence on the urban environment) available for the users.

These spaces bring a set of advantages **Error! Bookmark not defined.** for the growing populations living in urban environments (in the European Union 75% of the population lives in urban areas<sup>2</sup>). Some relevant benefits to take into consideration are:

- Urban residents have opportunities to be exposed to nature
- Urban biodiversity is maintained and protected
- Environmental hazards such as air pollution or noise are reduced
- Quality of urban living is enhanced
- Health and well-being of residents can be improved
- "Urban Heat Island" (UHI) effect is reduced
- Recreational activities can be developed in those spaces

### **Advantage of nature exposition for Urban Residents**

It is widely recognized that people benefit from contact with nature. How can this be achieved in an urban environment and what specific benefits can people extract from it?

The benefits are related to several areas namely<sup>3</sup>, inspiration towards active lifestyles, stress reduction, improvement in learning and mental performance in general. It also supports children's connection with the natural world by providing places for them to play and by giving them a positive development and environmental protection awareness, among others.

Daily doses of urban nature deliver the benefits of improved physical, mental and social wellbeing<sup>4</sup>. As an example, results of a study suggested that visits to green areas of at least 30 minutes per week could reduce depression prevalence in up to 7% and high blood pressure in up to 9% of the population average prevalence of those illnesses<sup>4</sup>.

An interesting reading on this subject is "The Pigeon Paradox"<sup>5</sup>, even not being directly related with green areas, it shows very well how contacts with nature

change people and proves that people are more likely to take actions to preserve the environment when they have direct experiences in nature.

The spread of green areas in the urban environment make them available to a larger part of the population (the relative proximity of those areas is also a relevant factor so there is the need to have them spread around the cities).

### **The importance of Urban Biodiversity**

Cities only account for approximately 3% of Earth's surface but they play an important role and have a high impact on biodiversity<sup>6</sup>. This happens because big cities are usually located in important ecosystem junctions and they drive to highly transformed landscapes and rapid human-caused changes to those ecosystems.

Research shows that urban biodiversity has a clear impact in human physical and psychological health, societal and cultural health and economic health and stability<sup>6</sup>.

So, the greater the biodiversity in the urban environments the better.

Green areas contribute significantly to that diversity, fixing flora and fauna. All efforts on conservation and restoration of native vegetation in the urban areas can drive to greater concentration of both birds and plant species and consequently to the increase on the urban biodiversity<sup>7</sup>.

The size of urban green areas is also relevant since sites of more than 50ha are necessary to retain area sensitive species<sup>8</sup> and to avoid biodiversity reduction.

### **Impact on air pollution and noise reduction**

Trees can act as natural filters for both pollutant gases and particles in urban environments<sup>9</sup>. The bigger the trees, the most relevant is the effect. It is also crucial to assure the trees health to take more advantage of this benefit.

Trees remove gases through leaf stomata and through their surfaces. This is a lastly removal, achieved by chemical reactions.

At the same time, they remove particles from the air. This is usually a temporary retention.

Green areas, particularly trees and big shrubs, also reduce ambient noise, working as sound barriers and reducing sharper tones<sup>10</sup>.

Studies demonstrate that residents in neighborhoods with parks and other green areas show relevant less dissatisfaction and disturbance due to traffic noise<sup>10</sup>.

Size and density of the plants also determine the amount of noise reduction. Dense planting with no gaps can reduce noise in up to 15 decibels<sup>10</sup>.

### **Quality of Urban Living**

Several studies show evidence of a positive association between urban green areas and attention and mood, and a negative association with mortality and short-term cardiovascular markers (heart rate)<sup>11</sup>.

This clearly proves that, urban green areas, improve quality of urban living.

### **Health and well-being of residents is improved**

One area in which this is very clear is the improvement of the cognitive function<sup>12</sup>. Several cognitive functions can be considered: directed-attention mechanism, reduced glucose consumption (glucose depletion worse cognitive performance) and increased cognitive control, as well as avoidance of health problems like chronic stress and attention fatigue<sup>13</sup>.

Other benefits for health of urban populations include stress reduction by contacting with nature<sup>14</sup> (specially for the people with high levels of stress) and restorative physiological responses<sup>15</sup> like reduced blood pressure, heart rate, skin conductance and muscle tension.

So, there is no doubt that health of the populations living in urban environments is clearly and directly affected by the level of proximity and availability of green areas.

### **“Urban Heat Island” (UHI) phenomena and effect reduction**

A UHI is a metropolitan area which is significantly warmer than its surroundings<sup>16</sup>. Heat Islands form as vegetation is replaced by asphalt and concrete for roads, buildings, and other structures necessary to accommodate growing populations.

The temperature in these UHI can be up to 12 degrees higher than in the rural surrounding areas<sup>17</sup>. This increase in temperature is supported by the fact<sup>16</sup> that the air is blocked between the tall buildings and the narrow streets and exacerbated by the heat caused by vehicles, factories, air conditioners and other causes, contributing to a set of factors that all together have a strong impact. This is a phenomenon that is completely independent from global climate change.

Important and often presented solutions<sup>18</sup><sup>19</sup> to reduce this problem are related with the use of urban green areas:

- Planting trees that will provide shade and cool the air through evapotranspiration; buildings surrounded by trees have a smaller need and cost of air conditioning

- Green roofs and walls, insulate buildings from heat and cool the air due to evapotranspiration
- All vegetation, namely in green parks, help to mitigate the UHI effect and to cool down the surrounding buildings reducing the need for energy consumption

As a conclusion, the urban green areas are an important element to reduce the quantity and intensity of UHI in cities.

### **Urban Green Areas as crucial elements for recreational activities development**

This is particularly relevant for vulnerable groups such as children and older people, in the scope of physical activities and social interaction<sup>20</sup>. Children show a strong usage of playgrounds and natural lawn areas while older people show a significant usage of both benches and shaded areas.

Urban green areas usage increases if temperature is lower than 30 degrees. Considering that those green areas help reducing the urban temperature so they also contribute directly to their increased usage by the population.

### **Conclusion and Future Developments**

From all the above, we can easily conclude on the importance of the green areas for the health and wellbeing of populations living in urban areas.

This conclusion could be reached by empirical evidence, however, with this simple analysis, it is shown that most of the statements are supported by scientific information.

It is important to understand the influence of the green areas distance in its usage. The frequency of usage decreases with longer distance<sup>21</sup>.

It would be interesting to go further in this analysis by relating the conclusions to the importance of the good maintenance of urban green areas. Their quality is relevant for people satisfaction. Residents in neighborhoods with more accessible green areas have higher satisfaction than those living in neighborhoods with equivalent green areas size but with less usability and accessibility<sup>22</sup>. Additionally, neighborhood satisfaction is significantly and positively related with wellbeing perception.

Quality of the urban green areas is also relevant to biodiversity increase so this is also an additional driver to support the importance of good planning and maintenance of those areas.

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