**Human health and nature conservation in urban green areas**

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Within the coming 20 years, the infrastructure of cities will at least double and cities will harbor 60 percent of the global population. Urbanization leads to decrease and fragmentation of urban green areas. At the same time as the destruction of green areas intensifies, the knowledge of their importance to contribute to humans through ecosystem services increases. There is now a consistency in that urban green improves human health through e.g. reduction of pollutions, urban heat effects, and stress. Few studies have however revealed how health is linked to different qualities of urban green (type of habitats and biodiversity), different senses (sight, sound, and smell), demography (gender, age) or physiological mechanisms (e.g. stress reduction). In the lecture I will review my research linked to the availability of urban green habitats, biodiversity and how these prerequisites affects human perception, health and nature conservation.

Surprisingly little is known about the availability of urban green. There are few national monitoring programs globally mapping urban green areas and none in Sweden. As a result planners and researchers often define areas as “green” regardless if they are urban forests, parks, allotments or lawns. In Sweden, more than 50 percent of what is considered to be “urban green” are lawns. A global estimation suggested that 20 percent of all urban areas consisted of lawns. Swedish cities have on average 20 percent urban forest cover. These urban forests have equal diversity of bird species as similar sized non-urban forests outside cities, although different species composition. Urban fringe forests have significantly higher amount of deadwood than average forests outside cities. This indicates that cities to some extent may provide rare habitats. In a global study of birds this was partly confirmed where 20 percent of all birds were found in cities,. Biodiversity is nevertheless declining rapidly in cities and there is an increasing trend of homogenization of species composition among cities, making the species pool more similar between the cities than the nature around.

One way forward for nature conservation in general could be to promote the importance of nature for human health. A study of urban forests revealed that respondents had a higher perceived well-being than in parks. Urban parks and forest does reduce stress (within minutes) while urban areas seem to constantly be stressful. Some studies show that high biodiversity increases well-being, increases positive perceptions, reduces chronic inflammation and stress while other studies find no such effects.

Present studies are skewed towards visual features and so is planning. Adding soundscapes such as bird songs and water have been found to increase people’s positive perception. Smell of mushrooms and fir showed to reduce stress while bird songs and Virtual Reality (VR) photos of urban green did not. Also demography matter; women and elderly (more than men and younger) increase well-being and have different movement patterns in urban green. Gender differences have also been observed in physiological studies where women reduce stress in parks while men did not reduce their stress as much.

Taken together, urban green seems to have positive effects on humans, we are reducing the possibilities to experience a nature that potentially have higher conservation values than elsewhere. Virtual Reality techniques have showed promising results in laboratories to reduce stress but if VR may be a future substitute to existing nature is yet to be investigated. There is a need for further interdisciplinary research exploring the mechanisms between biodiversity and health, how people’s demography is physiologically affected by different urban greens, the evolutionary causes behind why greenery affects humans, dose response of urban green and reduced health’s costs if exposed for urban green, if truly sustainable cities are to be achieved.