



Valuing ecosystem services in urban areas

Technological progress has fostered the conception of an urban society that is increasingly decoupled from nature. Cities however depend on nature and the ecosystem services it provides to sustain life, health, security, social relations and to address some of the most pressing challenges, such as climate change, water and food security. While there is increased recognition that biodiversity and ecosystem services can contribute greatly to improve quality of life in cities, their multiple values are usually not fully taken into account in urban policy-making.

The values of biodiversity and ecosystem services need to be integrated into urban decision making in order to enhance urban resilience, health and quality of life while reducing the ecological footprint of cities and saving costs.

This URBES factsheet explains what the values of ecosystem services are and provides examples of their benefits for cities.

What are the values of ecosystems services?

Ecosystem services are defined as benefits that humans obtain from ecosystem functions or as direct and indirect contributions from ecosystems to human well-being, such as clean air, food, water filtration, flood prevention, noise reduction, recreation, climate regulation, and nature education.

The provision of ecosystem services in cities depends on the quality and quantity of urban green infrastructure. Green infrastructure includes parks, gardens, urban allotments, urban forests, wetlands, lakes and ponds in cities, but also the natural areas – such as forests, mountains and wetlands – surrounding urban spaces.

For the functions they deliver to people, ecosystem services are considered to have “values”. These values can be of different nature and can be translated into monetary and non-monetary terms.

Urbanisation can have significant impacts on biodiversity and ecosystem services. The multiple values of ecosystem services can be used to capture and recognize the importance of these services for society.

Economic values

Direct or indirect monetary values provided by urban ecosystems, e.g. avoided costs for air pollution reduction by technical solutions or property damage by natural barriers to environmental extremes.

Ecological values

Environmental outputs, which have value for humans, e.g. air purification, carbon storage and sequestration, water filtration, genetic diversity.

Socio-cultural values

Moral, spiritual, aesthetic, ethic, and values associated to urban biodiversity and ecosystem services, including emotional, affective and symbolic views attached to urban nature, as well as local ecological knowledge.

Health values

Health benefits obtained from urban green spaces, consisting of reduction of air pollution, as well as improved water quality, and mental health.

Insurance values

The contribution of green infrastructure and ecosystem services to increased resilience and reduced vulnerability to shocks, such as flooding and landslides.

As shown in the table, multiple values can be attributed to ecosystems, including social and cultural values, health, resilience to environmental changes and economic benefits. These values, however, are not often recognised in urban planning and decision-making and consequently, the impact from their loss remains invisible.

The monetary and health values, which ecosystem services bring can be exemplified as follows: urban vegetation moderates the local temperature and buffers noise. Loss of urban vegetation can lead to economic costs due to energy demand for heating and cooling buildings, health care expenses related to respiratory diseases, and maintenance of expensive infrastructures to abate noise and pollution.

Restoring urban green spaces can provide substantial long-term benefits to cities, for example by reducing property damages from extreme climate events, such as floods.

The non-monetary values of ecosystem services include diversity and richness of species, which are a source of inspiration for people. Among the socio-cultural values, there is increased community cohesion and local ecological knowledge while increased physical and mental well-being are considered health values.

Increased flooding is likely to be one of the most serious effects from climate change in Europe in the coming decades. The following example about the benefits of urban ecosystems to reduce the impact of heavy rainfall, underlines how nature can offer a valuable response to the challenges urban planners and policy-makers are facing. During heavy rain, cities may be flooded if the water cannot drain quickly into the ground and the sewage system in cities cannot cope with the amount of water. Increasing the impermeable surface area in cities leads to increased volumes of surface water run-off, which increases the vulnerability to flooding. Urban green spaces reduce surface runoff, following heavy rainfall, by intercepting water through the leaves and stem. The underlying soil also reduces infiltration rates by acting as a sponge by storing water in the pore spaces until it percolates

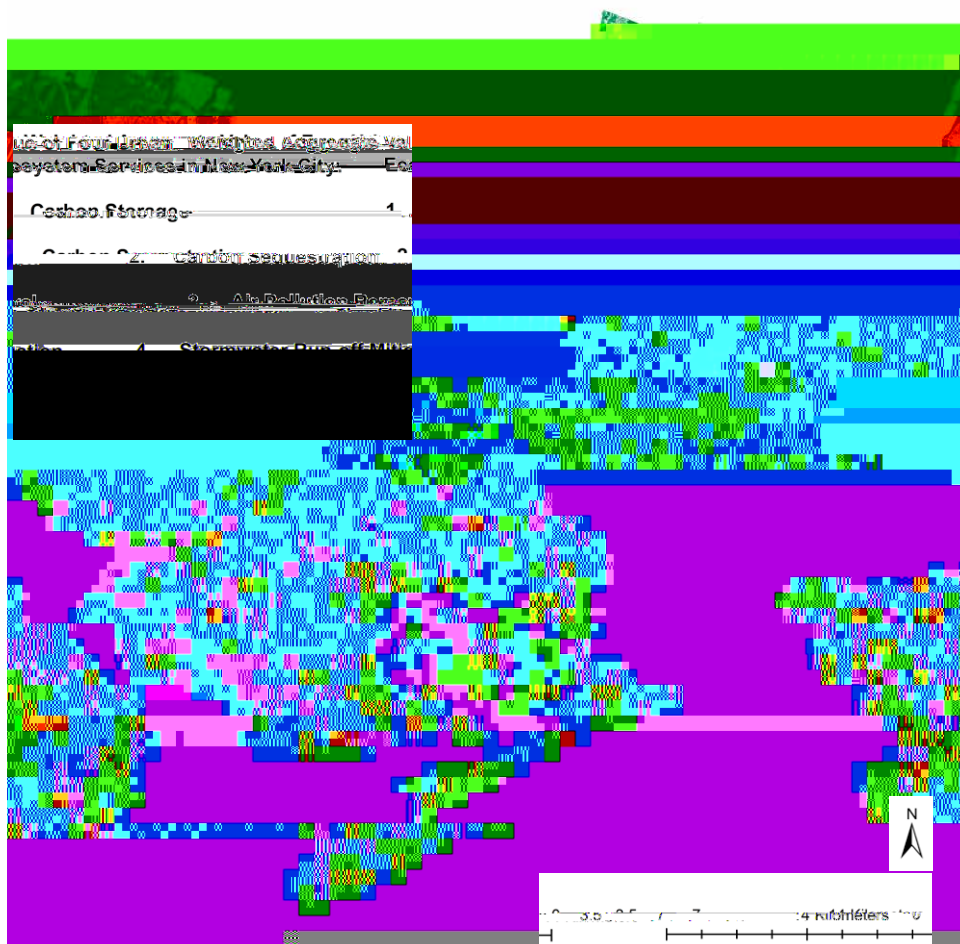
as through-flow and base-flow. Urban landscapes with 50–90% impervious cover can lose 40–83% of rainfall to surface runoff compared to 13% in forested landscapes. For example, green roofs can retain 25–100% of rainfall, depending on rooting depth, roof slope, and the amount of rainfall.

Urban planning can promote the ecosystem functions responsible for providing these benefits in parks and other green spaces by modifying ecosystem structure, in form or composition, so as to increase their value for urban quality of life.

Advancing the understanding of the multiple values of urban ecosystem services is essential for their integration in urban planning and moving towards more sustainable and resilient cities.

Non-monetary ecological values in New York City

One of the URBES partners, The New School in New York City, has mapped the non-monetary ecological values of four ecosystem services captured by the green infrastructure of the city. These services are: air pollution removal, storm water absorption, carbon storage, and carbon sequestration. The analysis has revealed that the non-monetary ecological values of these ecosystem services vary greatly within New York, following the distribution and presence of green areas.



The unique approach to assess multiple ecosystem services in New York demonstrates high heterogeneity of the urban ecosystems. In such situation, the values, and therefore benefits, to people will likely vary across cities and urban areas.

Results show a high spatial variation in the non-monetary value of the four selected ecosystem services. The quality and quantity of urban green infrastructure (e.g. bare soil, herbs, shrubs, trees) determine the total value of urban ecosystem services.

In addition to showing the relation between ecosystems and values, this information can be used to advise green space development.

Image Credit: Peleg Kremer

Note: ecosystem values in this map are assessed by calculating the amount of each service provided by NYC's green infrastructure at a spatial resolution of 1 m.

Contact:

Thomas Elmqvist
Stockholm Resilience Centre
Kräftriket 9A
11419 Stockholm, Sweden
Tel: +46 (0)705264806
info@urbesproject.org

. .