Measuring the benefits of urban nature-based solutions through quantitative assessment tools

A growing number of tools have been developed and applied to measure the benefits that healthy and functioning ecosystems provide to human well-being. However, few of these tools have been specifically designed for urban environments, which could be a reason for their limited adoption by urban decision-makers and spatial planners. This has resulted in widespread under-estimation of the potential and actual ecosystem services, and thus societal benefits, that nature-based solutions (NBS) can provide within cities.

In order to facilitate the use of empirical evidence as a rationale for greater NBS implementation in cities, this study developed and applied a comprehensive and systematic methodology for selecting, comparing and scoring ecosystem services assessment tools according to scientific criteria and practical requirements. This evaluation was undertaken from the perspective of Witteveen+Bos, an engineering consultancy firm in the Netherlands that wishes to enhance its empirical knowledge base of the contributions of NBS to human well-being in cities.

The scoring matrix presented in this study was aimed at assessing and ranking the suitability of open-access, quantitative assessment tools in capturing multiple ecosystem services across different urban landscape domains and societal contexts. Based on specific screening and evaluation criteria, i-Tree Eco was judged to be the best performing tool out of six tools and was subsequently applied to an urban case study (i.e. a large park in Amsterdam called Park Frankendael).

The application of i-Tree Eco served to further test its effectiveness, feasibility and limitations under Dutch urban conditions. i-Tree Eco is the flagship software of a suite of tools developed to analyse ecosystem structure, function, services and values. The basis for i-Tree Eco suite is tree allometric relationships between biomass, volume and function using measurements such as diameter at breast height (DBH), crown size and tree height.

The end product of this study was the creation of a value case for Park Frankendael which highlights key quantitative, qualitative, monetised and non-financial insights into the multiple ecosystem services that are currently being provided by the park to the city and its residents. Future applications of the i-Tree Eco tool in urban projects with natural ecosystem elements can further strengthen the value case for urban NBS and promote their inclusion into urban planning and decision-making.

Aerial view of Park Frankendael, Amsterdam
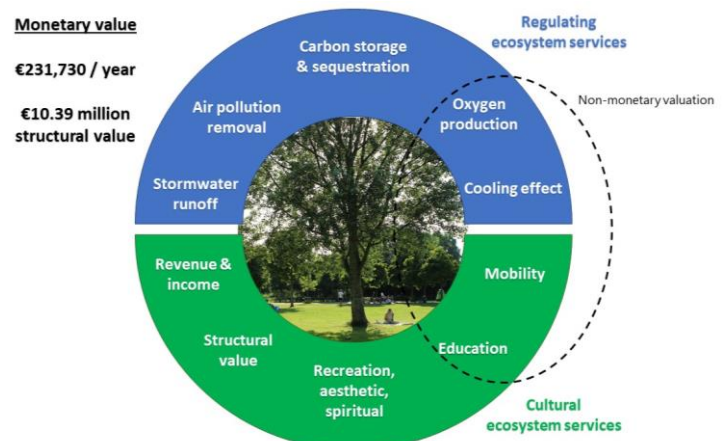
Value case of urban ecosystem services for Park Frankendael