

Valuing Edinburgh's Urban Forest

- The urban forest comprises all trees within the urban realm. This includes trees in public and private spaces, trees in streets, gardens, parks and woodlands.
- Urban forests provide multiple benefits to society, often termed ecosystem services
- In 2011 the structure and composition of Edinburgh's urban forest was surveyed. This information was used to quantify and value these ecosystem services
- i-Tree Eco was used for this assessment
- It provides essential baseline data to inform management & policy support for the long-term future of Edinburgh's urban forest



This project estimated the ecosystem services provided by Edinburgh's urban forest to be worth £1.82 million per year

Background

Urban trees benefit people who live and work in towns and cities by providing a range of ecosystem services. These can be valued using models like i-Tree Eco, developed by the US Forest Service. Ecosystem services provided by the urban forest includes enhancing health and well-being through improving air quality, reducing stress and supporting active, social lifestyles. It supports city sustainability through mitigating climate change, cooling urban areas and reducing flooding, while also supporting local biodiversity. The value of urban trees has been recognised in Scottish national policy, but protecting and maintaining this resource for Edinburgh's communities requires information on its condition and structure in Edinburgh itself.

Objectives

This research aimed to:

- identify tree species, sizes and health
- calculate the ecosystem services they provide
- determine the distribution of trees across land-use types and the extent of land available to plant more trees
- value the trees as a community asset, and
- assess the risks posed by pests and diseases to ecosystem service delivery by the trees.

Methods

An advanced survey and valuation tool was applied in summer 2011 to survey the trees across Edinburgh City. Trees were surveyed within 200 random plots, which gathered information on tree species, their form and condition, as well as land use and ground cover information. This was used to calculate the ecosystem service provision by, and the economic value of, Edinburgh's urban forest. The replacement and amenity value of trees was assessed using CTLA & CAVAT methods. Data analysis was conducted in the US by Davey Tree Ltd. using i-Tree Eco v6.

Findings: state of Edinburgh's urban forest (in 2011)

Number of trees: 712,000	Equal to an average of 62 trees per hectare, substantially lower than that of other studied areas in Scotland and Wales.
Tree cover: 17%	Higher than most other studied areas. Most trees are found in residential land, parks and institutional land.
Proportion of large trees: 6%	Lower than the recommended 10% value, though higher than other studied areas. Proportion of medium-sized trees was 35% and small trees 59%.
Number of species: 50	Includes both tree and shrub species. This is fewer than in other studied areas. The most common species were sycamore, holly and silver birch.

Findings: ecosystem services provided by Edinburgh's trees

Stormwater mitigation	183 million litres of water intercepted annually	Worth £247,000 annually in avoided sewerage charges
Air pollution removal	195,000 tonnes of airborne pollutants removed annually	£575,000 annually in avoided damage to health, buildings & crops
Carbon sequestration	4,880 tonnes of atmospheric carbon removed annually	£1 million annually for climate change mitigation
Carbon stored	179,000 tonnes of carbon stored in current stock of trees	£39.8 million (lifetime) for climate change mitigation

Threats, Opportunities and Recommendations

- **Available land for planting** in Edinburgh is high at up to 55% by land-use, offering opportunities to expand the urban forest and increase the provision of ecosystem services.
 - **Recommendation:** Set a canopy cover target of 22% to encourage tree planting in areas of low canopy cover or highest environmental need.
 - **Recommendation:** Increase street tree planting, especially in development areas
- **Pests and diseases** like Chalara dieback can threaten the health of Edinburgh's urban forest and result in loss of trees and ecosystem services. The total replacement value of Edinburgh's urban forest is £387 million; rising to £3,066 million for replacement on a like-for-like basis.
 - **Recommendation:** Diversification will reduce the risk of pest and disease outbreaks.
- **Tree size diversity** in Edinburgh is poor with large diameter trees composing only 6% of the population. Larger trees provide significantly more benefits than smaller trees.
 - **Recommendation:** Planting of large stature trees should be considered and management should protect and support the continued growth of the medium-size trees so the proportion of large trees can be increased in the short-term.
- **Trees on private land** composed a high proportion of Edinburgh's trees (75%), leaving them outside of management and protection of most tree policies.
 - **Recommendation:** The vulnerability of these trees to change should be recognised and education for land-owners could encourage positive stewardship.
- **This study** demonstrates the value that urban trees provide for all people in Edinburgh.
 - **Recommendation:** i-Tree Eco surveys should be repeated every 5-10 years to support long-term management of Edinburgh's urban forest.