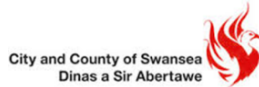




Valuing ecosystem services provided by the urban trees of the Tawe catchment



Urban forests provide a range of services, often termed ecosystem services that help alleviate problems associated with urbanisation. Trees improve local air quality, capture carbon, reduce flooding and cool urban environments. They provide habitat for animals, and can improve social cohesion in communities. In summer 2014, Forest Research worked in partnership with Natural Resources Wales, the city of Swansea, Powys and Neath Port Talbot councils and Welsh Water to complete a survey of urban trees in the Tawe catchment, using i-Tree Eco, to quantify and value a range of these ecosystem services.



The ecosystem services provided by urban trees in the Tawe catchment are valued at £1,720,000 per year

Background

Urban trees benefit people who live and work in towns and cities by providing a range of ecosystem services and these can be valued using models like i-Tree Eco, developed by the USDA's Forest Service. The i-Tree Eco study in Tawe catchment focussed on the ecosystem services of carbon capture, rainwater interception, the removal of air pollution, habitat provision and building's energy use. The threat to trees posed by pests and diseases, such as Chalara ash dieback, and the cost to replace the catchment's trees if they were lost was also calculated.

Objectives

This research aimed to:

- identify tree location, 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.

The study provides the essential baseline data required to inform management and policy making in support of the long term health and future of the urban forest of the Tawe catchment.

Methods

A survey of 252 random plots was undertaken across eight urban areas of the City of Swansea, Neath Port Talbot County Borough and Powys County. Information on 762 trees was recorded, including species, height and canopy spread, as well as details on the location - such as land use and ground cover. The cost of replacing trees if they were lost was calculated using tree valuation methods published by the Council of Tree and Landscape Appraisers and the London Tree Officers Association. Data analysis was conducted in the US by Davey Tree using i-Tree Eco v5.

Findings – Tawe catchment’s urban forest:

- o has over **530,000 trees**, resulting in an average **urban tree density of 76 trees per hectare**, this is above existing estimates for other areas in the UK
- o has a **16% urban tree cover**, equal to an area of 1,119 ha. The trees were primarily found in **parks**, on **residential land** and on **vacant land**
- o has a **low proportion of large trees** compared to previous i-Tree Eco studies conducted in the UK, and would benefit from more medium and large sized trees
- o includes **88 tree and shrub species**, recorded across 12 land use categories. **Common alder, goat willow** and **downy birch** are the top three tree species.

Findings – The trees in the Tawe catchment:

- o intercept an estimated **252 million litres of water every year**, equivalent to an estimated **£333,900** in sewerage charges avoided
- o remove an estimated **136 tonnes of airborne pollutants** each year, worth more than **£715,500** in damage costs
- o remove an estimated **3,000 tonnes of carbon** from the atmosphere each year, this amount of carbon is estimated to be **worth £671,000**
- o store an estimated **102,000 tonnes of carbon**, estimated to be **worth £23.1 million**.

Findings - Threats and Opportunities:

- o *Phytophthora kernoviae*, *P. alni* and Gypsy moth pose significant threats to the current urban forest; these *Phytophthora* are already present in S Wales and could affect >8% of Tawe catchment’s tree population, and the Gypsy moth is a pest to 22.7% of this urban tree population
- o The cost of replacing all of the Tawe catchment trees is estimated at £234 million; this rises to **£816 million** if valuation is based on visual amenity and replacement on a like-for-like basis
- o A further **24% of urban land** in the area **could be planted with trees** or shrubs.

Recommendations

This study demonstrates the value that the urban trees of the Tawe catchment provide to society. At 16%, tree canopy cover is comparable to the Welsh average (17%); but with 24% of the land suitable for planting with trees, canopy could be increased to enhance the overall benefit to society. Trees capable of attaining large stature, such as limes, oaks and some pines, provide more ecosystem services per tree; species choices should reflect this. Three species were very common, each making up more than 10% of the population. Planting a wider variety of trees would decrease the risk of loss to pests and diseases. Trees on private land represented 62% of the total tree population - a valuable overall contribution to the urban forest meriting recognition and need for greater care and protection. A repeat Eco survey in 5-10 years is recommended to support the long-term management of this urban forest.

Partners

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